

STRUCTURAL CHARACTERISTICS THAT PREDICT QUALITY IN PRESCHOOL-AGE  
CLASSROOMS IN CHILD CARE CENTERS

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# STRUCTURAL CHARACTERISTICS THAT PREDICT QUALITY IN PRESCHOOL-AGE CLASSROOMS IN CHILD CARE CENTERS

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The goal of this study was to investigate relations between structural characteristics and quality (Early Childhood Environment Rating Scale; ECERS) of early childhood classroom environments in 100 child care centers licensed by the PA Department of Public Welfare to determine: a) a minimum set of structural characteristics that can be used to predict quality, b) to identify threshold values of structural characteristics that could be used to discriminate between categories of quality, and c) to determine whether the minimal set of structural characteristics also could be used to predict quality in preschools. Teacher and director pre-service education, teacher and director continuing education, teacher and director wages, provision of benefits to staff, and training budget per staff member consistently predicted quality, accounting for between 27.4% and 28.9% of the variance in ECERS Total Score. Further, this set of structural characteristics accurately predicted 52% of “Good,” “Mediocre,” and “Poor” quality sites. Yet, even within this smaller set of eight structural predictors, two structural characteristics (percent of teachers in the center that have an Associate Degree or higher and the number of benefits) and their interaction most strongly accounted for variance in quality across sites and demonstrated a significant interaction effect. When applied to 38 preschools licensed by the PA Department of Education, teacher education and benefits predicted quality but to a lesser extent. The findings

have implications for policy and practice as states develop tiered strategies and standards to recognize and reward differing levels of quality in early care and education programs, and it is recommended that these strategies and standards include attention to the educational levels of classroom teachers and the provision of adequate staff benefit packages.

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## INTRODUCTION

A variety of factors impact children's development throughout their lives, including endogenous factors, family experiences, and non-familial environments. As a non-familial environment, child care has become the normative experience for most children under the age of five in the United States (U.S. Department of Commerce, 2002). Although parenting factors and family experiences demonstrate stronger relations with child outcomes, child care experiences consistently have been found also to predict various types of child outcomes (National Research Council and Institute of Medicine, 2000). Thus, recent attention has been drawn to the relative influence of child care and how these early experiences relate to children entering school ready to succeed at learning, or "school readiness outcomes" (Knitzer, 2002).

Research on child care shows that school readiness is associated with high quality early childhood program experience (Barnett, 1993; Campbell et al., 2001). In particular, Love et al. (1996) specified that young children who participate in high quality programs have better cognitive, social, and language development than children participating in lower quality child care programs. Consequently, states across the nation have become increasingly interested in child care, or pre-kindergarten experiences, as a service to improve the school readiness of young children. While traditional state regulation of child care had focused on health and safety issues, more and more states are adopting methods to increase the availability of high quality child care that also includes programs to promote school readiness. In fact, 36 states have adopted a tiered

strategy to distinguish between different levels of quality within child care settings and to encourage program administrators to improve the quality of their programs (Collins, August 19, 2004). Often, the tiered strategies use a set of criteria to define quality. Factors might include teacher education, parent involvement, provision of benefits, and teacher:child ratio. In most cases, there is some research basis, scientific evidence, or best practices convention for the use of the various criteria.

PA began using a tiered strategy to encourage high quality in child care in 2002. The PA Department of Public Welfare instituted Keystone STARS, a program to encourage child care centers to strive to meet higher standards of quality. The Standards address five areas: 1) staff qualifications, professional development, and compensation; 2) learning environment; 3) partnerships with family and community; 4) administration; and 5) continuous quality improvement. Sites achieve one of four overall “Star” ratings, with STAR One programs meeting the first level standards and STAR Four programs meeting the highest standards. The State provides financial incentives to sites that improve their quality ratings as reflected by achieving higher STAR ratings.

However, it is not clear how accurately each of the criteria for STARS designations, or the standards in other states, actually relate to quality, particularly quality as measured by observational methods and quality that is associated with school readiness, which is often the underlying intent of the rating system. Often, the program administrators are not fully informed about the literature; furthermore, the literature does not always provide the clarity of relations needed to define the tiered strategy standards. Also, states are limited to characteristics that are easily and reliably implemented, which they must “trust” serve as surrogate variables that in turn relate to the aspects of quality that actually lead to improvements in child development.

## PURPOSE AND RATIONALE OF THIS STUDY

Given these challenges in developing state standards to recognize and encourage high quality practices in child care settings, the purpose of this study is to identify “structural” characteristics of quality, such as teacher education and group size, which best predict observed quality in child care centers and preschools serving 3 – 5-year-olds in Pennsylvania. Structural, or regulable, characteristics are those aspects of the child care environment that can be regulated or controlled by policy. For example, states cannot assess or regulate the number of positive, warm interactions teachers should have with children on a daily basis. Structural, or regulable, characteristics are used in an attempt to create the conditions that would foster such interactions.

Thus, this study is based on the conceptual premise that structural characteristics of care can provide the context in which caregivers can have frequent, positive, verbally stimulating, and cognitively challenging experiences with young children that promote cognitive, language, and social development (e.g., school readiness). Drawing from social learning theory, children are more likely to learn from adults with whom they have positive relations, and they learn more positive ways of interacting and thinking when such behaviors are modeled by adults. Further, the organizational structure of the child care environment can facilitate the types of interactions with the environment that promote cognitive development based on Piagetian theory.

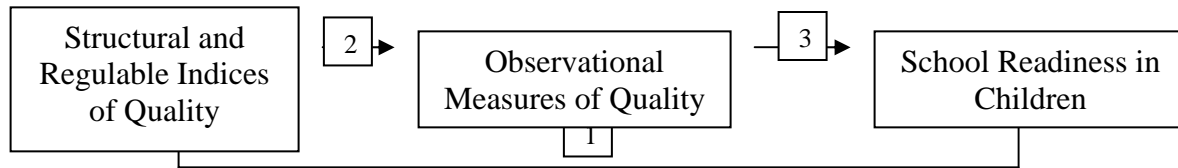
Indeed, relations between such regulatory standards and child care quality and between regulatory standards and child outcomes have been demonstrated in research comparing quality in early care and education programs across states that have different licensing requirements and in studies of associations between the number of standards met and child outcomes. For example, Gallagher et al. (1999) found that sites in states that had higher regulatory standards (e.g., lower group sizes, lower staff:child ratios) tended to have higher quality care than sites in states with

lower standards. Furthermore, linear associations have been found between the number of standards met and child outcomes, such as, language comprehension and behavior problems (NICHD Early Child Care Research Network, 1999). To guide the creation of regulations, and thus child care programs, that recognize and promote quality, it is important to identify factors that can be regulated and that indeed do contribute to a quality environment, thereby promoting school readiness.

The information gleaned in this study will be helpful in evaluating some of the criteria for state programs, including Keystone STARS, that attempt to promote classroom quality by demonstrating relations between regulable characteristics and observational measurements of quality. Further, some structural quality variables could be assessed in a more cost-effective manner (via telephone) than performing on-site, observational assessments across all child care facilities in Pennsylvania, and some characteristics may be more important correlates of quality than others. In addition, this information could be used to help refine developmental psychologists' understanding of the overlap, priority, and threshold effects (i.e., the minimum amount of a structural variable needed to produce a significant effect on observational quality) of different criteria.

## LITERATURE REVIEW

The following review discusses empirical research on those characteristics of child care programs that can be regulated, called “structural characteristics,” and their relations to classroom quality, which in turn relates to children’s school readiness outcomes. This review will be conducted in three parts. As an introduction to the content of the review, definitions of major concepts to be addressed in this study, including school readiness, classroom quality, and structural characteristics of child care, are provided. Next, the literature will be reviewed to identify the structural characteristics that best predict child outcomes, which will help guide the selection of the independent variables in this study (“1” in Figure 1). Second, the literature on the relations between structural variables and classroom quality will be reviewed to provide both a conceptual and empirical rationale for the independent and dependent variables addressed in this study (“2” in Figure 1). Third, a review of literature linking observational quality to child outcomes will be provided to further refine the selection of the dependent variable for use in this study and to provide further evidence that the regulable characteristics of quality ultimately relate to school readiness outcomes (“3” in Figure 1). Figure 1 describes the nature and sequence of the relations that will be reviewed.



**Figure 1: Plan for Review of the Three Literatures**

## DEFINITIONS

### School Readiness

Although American educators have recognized the importance of school readiness and its long-term implications, early education programs have struggled with what defines “school readiness” and, more importantly, identifying what kinds of experiences promote school readiness in young children. The National Education Goals Panel (1991) defined school readiness as “a combination of readiness in five key dimensions of a child’s early development and learning (i.e., physical well-being and motor development, social and emotional development, approaches toward learning, language development, and cognition and general knowledge) as well as readiness in school, family, and community supports.” Drawing from numerous studies, several child traits appear to compose school readiness, including good physical and mental health, effective communication skills, and an enthusiastic and curious approach to learning. In most cases, more traditionally academic-focused traits, such as recognizing the alphabet and counting, have been seen by early care and education professionals as less important in defining school readiness (Wesley & Buysse, 2003). To capture the essence of these definitions, “school readiness” will be defined in this study in terms of cognitive, language, and social developmental outcomes for young children.



## Quality and Structural Characteristics of Child Care

Several researchers have offered different definitions of early care and education program “quality.” Definitions of quality often focus on the use of “developmentally appropriate practices,” which have been summarized by the National Association for the Education of Young Children (Bredekamp & Copple, 1997). Drawing from all the definitions of quality that have been offered, three categories of characteristics are generally accepted (Love et al., 1996).

First, teacher and child interaction is a significant component of quality. Just as the attachment literature highlights the importance of sensitive and responsive caregiving, developmentally appropriate practices are rooted in the sensitivity and responsiveness of caregivers in child care settings. Teachers in high quality sites have frequent and positive reciprocal interactions with children and are attentive to children’s needs (Love et al., 1996). Furthermore, teachers who give generous verbal and cognitive stimulation, who are sensitive and responsive, and who give plentiful attention and support have children who are more competent in all aspects of development compared to children who do not have these kinds of experiences in child care (Lamb, 1998; Smith, 1998 as cited in National Research Council, Institute of Medicine, 2000). This aspect of quality may be more directly causal, but it would be costly to assess in a regulatory or incentive system and difficult to enforce.

Second, dynamics of the classroom tend to be a significant component of quality (Love et al., 1996). This includes features of the environment that support learning opportunities for young children, such as small group size and low teacher:child ratio, that may set the context for beneficial types of teacher-child interactions. In fact, findings from the National Day Care Study support this assumption (Phillips & Howes, 1987).

Third, staff characteristics, such as teacher education and specific training experiences, are important. These variables tend to correlate with teaching and interaction styles, including the use of developmentally appropriate practices. For example, a recent study has shown that more highly educated teachers demonstrate more positive attitudes and knowledge of appropriate early childhood education practices (Abbott-Shim, Lambert, & McCarty, 2000).

Structural, or “regulable,” aspects of child care centers, are found in the second and third categories of quality described above. In fact, the National Research Council (2000) combines these two categories and considers them together as “structural features of care,” which provide the second tier of characteristics of child care quality following teacher-child relationships. While it is difficult to mandate, costly to assess, and difficult to set standards for a particular style of interaction, structural features of the classroom and staff characteristics can be more easily defined, reported, identified, and verified by regulators with limited training. That is, a teacher either has a particular type of degree or not; there are fewer than a certain number of children in a group or not; and there is a particular benefit package available to staff or not. Thus, this literature review defines structural characteristics as those aspects of care that are easily reportable or accessible without using trained observers, that do not require interpretation to determine if they are present or not, and that can be easily monitored and checked for validity. Characteristics of center environments that are deemed “regulable” include those aspects of care for which policies can be written and enforced to ensure compliance with the characteristic.

## STRUCTURAL CHARACTERISTICS OF CHILD CARE CENTERS THAT PREDICT CHILD OUTCOMES (Figure 1 #1)

The most direct evidence for the importance of a structural characteristic is for it to be associated with child outcomes (#1 in Figure 1); only a few studies exist examining this association. A less direct line of evidence is the association between structural characteristics and quality (#2) and then between quality and child outcomes (#3). These three categories of associations will be reviewed in turn.

To identify a set of independent variables to use to predict quality, this literature review now will examine relations between structural characteristics of care and child outcomes (#1). The purpose of this review is to begin to refine the set of structural characteristics that will be used in this study as the variables predicting quality in analyses. Studies selected for inclusion in this review focus primarily on assessing quality in child care center classrooms for children between the ages of three to six years. The review is organized according to the types of structural characteristics that have been studied and includes the variables listed below along with a conceptual rationale for why the variable might relate to child development (see Table 1 for a brief description of structural characteristics). The types of child outcomes included in the studies focus on cognitive, language, and social developmental outcomes, and Table 2 provides a list of the types of measures used to assess these outcomes.

- Pre-Service Teacher Education – highest amount of education completed by teachers, sometimes measured as total years of school but often categorized as less than high school degree, high school diploma or GED, some college, etc. The influence may follow at least two potential pathways – general intelligence and particular knowledge and skills.

One of the hallmarks of promoting school readiness in young children is for adults to be cognitively and verbally stimulating in adult-child interactions. Adults with higher intelligence are able to make more associations across different contexts for young children and thereby expose them to more ways of creative problem-solving and thinking. Adults with higher intelligence have larger vocabularies and are more likely to use a variety of words to describe common, everyday experiences with young children. They are better able to expand on “teachable moments” and are more likely to engage in abstract/conceptual interactions. In short, adults with higher intelligence expose young children to a wider variety of experiences than adults who are not as intellectually gifted.

Teacher education in early childhood also provides adults with greater knowledge and skills to use in interaction with young children and to aptly employ developmentally appropriate practices when working with young children. Having knowledge of child development enables caregivers to respond to infant cues based on understanding what those cues mean. Having a knowledge of physical development leads to accurate expectations for when children can be expected to write and to developing activities to enhance the area of physical development within the zone of proximal development at that time. Educational experiences alert teachers to teachable moments, and educated teachers are more likely to deliberately “teach” words, numeracy, emergent literacy, logic, and scientific reasoning in a developmentally appropriate manner (Bowman, Donovan & Burns (Eds.), 2000).

- Teacher:Child Ratio – the average number of children assigned to a single teacher.

Teachers who are trained to promote child development need to have the time to exercise those skills outside of routine care responsibilities, such as feeding and diapering. The number of children that can be adequately cared for by one adult varies by age. For

instance, diapering takes a major amount of time for infants but is not relevant for 4-year-olds. Thus, there must be enough adults with a group of young children to meet the children's basic needs and still have time for the more "educational" activities that promote school readiness.

Adults need time and space to capitalize on individual learning opportunities in a way that expands on the individual child's attention. Thus, low teacher:child ratios allow time for meaningful, individual-focused, adult-child interactions. These interactions can be initiated by the child but skillfully adapted by the adult to promote cognitive, language, and social skills and provide for quality exchanges.

- Group Size – the number of children supervised in a single room or division of a room.

Young children have less well developed peer interaction and social skills as 3- to 5-year-olds. Therefore, participating in large groups with many other children can stress their coping skills. Adults in such environments may be forced to focus on putting out social interaction crises rather than fostering the types of learning experiences and adult-child interactions that promote school readiness. Similar to teacher:child ratio, smaller group sizes allow time for meaningful, individual-focused, adult-child interactions.

- Director and/or Staff Experience – number of years experience on the job as a child care director or teacher.

Generally, years of experience in an occupation foster the development of skills necessary to complete tasks efficiently and effectively. Thus, it would be expected that directors and staff with more experience are better at interacting with young children and structuring the environment to support learning. On the other hand, this positive expectation must be balanced by other negative consequences associated with increased years on a job, such as burn-out.

- Center Financial Practices – a set of measures including the wages paid to teachers, budget allocated for training expenses per staff person, and number and types of benefits provided to staff.

Teachers with higher wages are more likely to be more highly educated, which is likely to demonstrate benefits as mentioned previously. Early care and education programs that hire more highly educated and trained teachers generally are more likely to have teachers who consider themselves to be career or professional teachers. Career-minded early childhood teachers that are better paid are less likely to leave their jobs, and it is a well established research finding that high turnover relates to low quality (National Research Council, Institute of Medicine, 2000). Well-paid teachers may feel good about their jobs and themselves, and these positive feelings may be transmitted to the children via their interactions. In addition to the impact financial resources can have on staffing practices, sites that are better-funded also can provide more materials in the child care environment, such as water tables and outside play equipment that can be used to create varied learning experiences.

- Curriculum Use – use of a standardized curriculum in the classroom or center.

Use of a curriculum helps teachers of young children to structure daily activities.

It is expected that developmentally appropriate curricula would encourage stimulating activities to promote child outcomes. When teachers are trained in how to adapt developmentally appropriate curricula to meet the needs of individual children, the experiences can benefit learning. However, use of a curriculum in absence of ensuring teacher understanding and competence in delivering the curriculum may impede the learning process for the young child by focusing on inappropriate expectations for progress.

- Continuing Education - amount of time teachers spend in training experiences, usually reported annually.

Similar to teacher education, participation in training experiences can help directors and staff learn skills to apply in the child care environment that promote child development. When continuing education is sequential in nature and provides opportunities for directors and staff to reflect on their practices and the impact of changes in their practices on young children, the experience can foster improved classroom quality, thus improving child school readiness outcomes. However, when continuing education is provided in a disjointed manner with no focus on acquiring expertise in a focal set of skills, then there is no expectation for positive relations to quality or to child development.

- Use of Developmental Assessments – use of tests or skills assessments to identify children’s skills and competencies.

Programs that require and use developmental assessments are more likely to define their purpose as at least partially being to promote child development. Staff who are trained in how to complete these assessments and how to use them to inform instructional practices create dynamic learning environments specifically designed to support individual learning. For these reasons, it is expected that programs that use developmental assessments are more likely to relate to improved quality and to foster school readiness outcomes.

- Skills Taught to Children – programs that promote a staff focus on explicitly teaching children a set of discrete skills, such as how to hop, the alphabet, or how to follow directions.

Programs that encourage staff to teach a discrete set of skills to children are more likely to be focused on child outcomes as an explicit program goal. These programs are more likely to

identify expectations for children to achieve certain developmental milestones and are aware if children do not meet these goals. However, expectations must be developmentally appropriate to avoid frustrating young children as well as the staff. Thus, it is expected that programs that report that they explicitly teach a set of skills to young children paired with an appropriate understanding of child development are likely to show improved quality and school readiness outcomes.

- Parent Involvement – provision of activities that involve parents in their children’s learning or the center’s activities and/or programs.

There is a body of evidence that indicates that parents who are involved in their young children’s early care and education programs have children who demonstrate improved academic performance (Clements, Reynolds & Hickey, 2004). Thus, child care programs that provide ample opportunities for parents to be involved are more likely to promote positive child outcomes. Further, these programs are more likely to be of higher quality because parents would have greater opportunities to monitor center practices as they participate in center activities.

- Transition to School- provision of activities to help children transition to kindergarten or other school settings.

For young children, events around the transition from the early childhood environment to the school environment can be particularly stressful (Pianta, Rimm-Kaufmann & Cox, 1999). Research has found that children who experience a smooth transition to kindergarten perform better in kindergarten (Early et al., 2001). Thus, programs that recognize the developmental challenges associated with this transition and that implement activities to help families and children make the transition seamlessly tend to be more aware of early learning needs.



- Accreditation – achieve standards for national accrediting bodies (e.g., National Association for the Education of Young Children) and receive recognition of this achievement.

Programs accredited by national professional organizations are likely to endorse quality as a focus for programs and improved child outcomes as a goal for their services.

**Table 1: Descriptions of the Structural Characteristics Examined for Relations to Child School Readiness Outcomes**

<b>Structural Characteristic</b>	<b>Description</b>
Pre-Service Teacher Education	Highest amount of education completed by teachers, sometimes measured as total years of school but often categorized as less than high school degree, high school diploma or GED, some college, Associate's degree or Child Development Associate, Bachelor's degree, and advanced degree
Teacher:Child Ratio	The average number of children assigned to a single teacher
Group Size	The number of children supervised in a single room or division of a room
Director and/or Staff Experience	The number of years experience on the job as a child care director or teacher
Center Financial Practices	A set of measures including the wages paid to teachers, budget allocated for training expenses, and fees paid by parents
Curriculum Use	Use of a standardized curriculum in the classroom or center
Continuing Education	Amount of time teachers spend in training experiences, usually reported annually
Use of Developmental Assessments	Use of tests or skills assessments to identify children's skills and competencies
Skills Taught to Children	Programs that promote a staff focus on explicitly teaching children a set of discrete skills, such as how to hop, the alphabet, or how to follow directions
Parent Involvement	Provision of activities that involve parents in their children's learning or the center's activities and/or programs
Transition to School	Provision of activities to help children transition to kindergarten or other school settings
Accreditation	Achieve standards for national accrediting bodies (e.g., National Association for the Education of Young Children) and receive recognition of this achievement

Table 2: Types of Instruments Used to Assess Child Cognitive, Language, and Social Developmental Outcomes in Studies Examining Relations between Structural Characteristics of Child Care and Child Development

<b>Developmental Domain</b>	<b>Instruments</b>
Cognitive	<p>Observation of Peer Play</p> <p>Achievement Tests</p> <p>Bracken Basic Concept Scales (Bracken)</p> <p>Woodcock-Johnson Achievement Tests –Revised (WJ-R)</p> <p>Continuous Performance Task</p> <p>Early writing skills</p> <p>Slosson Test of Intelligence (Slosson)</p> <p>Bayley Scales of Mental Development</p> <p>Classroom Behavior Inventory –Intelligence (CBI)</p> <p>Classroom Behavior Inventory – Task Orientation (CBI)</p> <p>Math and reading school readiness assessment</p> <p>FACES Battery</p> <p>Pre-Reading test</p>
Language	<p>Peabody Picture Vocabulary Test (PPVT)</p> <p>Reynell Developmental Language Comprehension Scale (Reynell)</p> <p>Sequenced Inventory of Communication Development (SICD) – Expressive Scale</p> <p>Preschool Language Assessment Instrument (PLAI)</p> <p>Adaptive Language Inventory (ALI)</p> <p>Test of Early Language Development (TELD)</p> <p>Oral communication task</p>
Social	<p>Play with peers</p> <p>Child Behavior Checklist (CBCL)</p> <p>California Preschool Social Competence Scale</p> <p>Classroom Behavior Inventory – Considerateness (CBI)</p> <p>Classroom Behavior Inventory – Dependence (CBI)</p> <p>Classroom Behavior Inventory – Sociability (CBI )</p> <p>Preschool Behavior Questionnaire – Aggression (PBQ)</p> <p>Preschool Behavior Questionnaire – Anxiety (PBQ)</p> <p>Preschool Behavior Questionnaire – Hyperactivity (PBQ)</p> <p>Social awareness measure</p> <p>Problem Behavior Rating Scale – Hyperactive</p>

## Relations from Structural Characteristics to Cognitive Development

*Relations of Pre-Service Teacher Education to Cognitive Development.* Teacher education consistently has been related positively to cognitive development in the studies included in this review. In six studies that assessed teacher education, four found significant positive relations. Howes (1997) found that teachers with Bachelor's degrees in Early Childhood Education had children who exhibited more complex play with objects, but no significant relations were found between teacher education and subscale scores in the reading and math versions of the Woodcock-Johnson Tests of Achievement. This suggests that teacher education may play a more significant role in the development of more practical, or functional, cognitive skills (i.e., play skills) as opposed to more academic types of skills at these early ages. However, since the study did not control for family background and selection effects, it may be that parents with certain characteristics, such as higher education or higher income, selected centers with teachers with degrees in Early Childhood Education and that these parental characteristics actually promoted particular child outcomes. In a study that looked specifically at whether meeting regulatory standards was related to child outcomes, the NICHD Early Child Care Research Network (1999) found that meeting staff education standards was associated with higher Bracken scores. Further, there was a 4.4 percentile point increase on the Bracken for each additional standard that a child care provider met.

In this same sample, structural equation modeling techniques revealed a significant indirect path from education through caregiving to cognitive competence as assessed using the WJ-R, the Preschool Language Scale, and the Continuous Performance Task (NICHD Early Child Care Research Network, 2002a). Zill et al. (2003) likewise showed that teacher education

was linked to greater gains in early writing skills, with children taught by teachers with a Bachelor's or Associate's degree performing better than children taught by teachers with less education. In a study of African-American children in center care assessed at three years, Burchinal et al. (2000) also demonstrated relations between teacher education and Bayley scores, but only for girls. Perhaps, it is more difficult for teachers to form the kind of close relationships with young African-American boys that foster cognitive development – even at these very early ages. One study that did not find relations with teacher education (Kontos & Fiene, 1987) used an IQ test as the cognitive measure. IQ scores may be more difficult for early care and education to influence than more functional measures of cognitive development. Overall, relations between teacher education and cognitive development appear fairly consistently but are of modest magnitude.

*Relations from Teacher:Child Ratio to Cognitive Development.* The next most common structural characteristic that has demonstrated relations with cognitive development in prior research is teacher:child ratio. Three of the nine studies that examined ratios found significant relations with children's functioning. Howes (1997) found that compliance with recommendations for ratios was related to higher WJ-R reading scores but not WJ-R math scores. In a study that assessed ratio without controlling for whether the sites were compliant with regulations, Burchinal et al. (2000) demonstrated the expected negative relations with the Bayley ( $r = -.44, p = .01$ ); that is, smaller ratios were associated with better performance on the Bayley scale. Finally, the NICHD Early Child Care Research Network (2002a) discovered a significant indirect path from ratio through caregiving to cognitive competence, suggesting that caregivers with fewer children to monitor can provide more positive and stimulating interactions which in turn affect cognitive competence. The studies that did not find relations between ratio

and child outcomes used measures such as the CBI-Intelligence and CBI-Task Orientation scales, a math and reading school readiness assessment, the Slosson, and the FACES battery of tests (Phillips, McCartney & Scarr, 1987; Broberg et al, 1997; Phillips, McCartney & Scarr, 1987; Kontos & Fiene, 1987; Zill et al., 2003). Ratios may not consistently relate to cognitive development outcomes due to potential differences across studies in the rate of participation of sites compliant with national recommendations and differences between ratios required in one state compared to another. Because most sites have fairly strict ratio requirements, this lessens variability in study samples, which is likely to have decreased the probability of detecting statistically significant associations with child outcomes.

*Relations between Group Size and Cognitive Development.* Group size has shown only limited relations to cognitive development. In two studies, group size was related negatively to cognitive development as assessed by the Bayley (Burchinal et al., 2000) and the Slosson (Kontos & Fiene, 1987). In these studies, smaller group sizes were associated with better performance on cognitive assessments, as expected. Two other studies assessing group size, however, found no specific relations (Broberg et al., 1997; NICHD Early Child Care Research Network, 1999). Similar to teacher:child ratio, group size tends to be highly regulated; therefore, the lack of relations most likely is due to low variability across sites.

*Relations of Staff and/or Director Experience to Cognitive Development.* Only one study, Kontos and Fiene (1987), revealed negative relations between director experience and children's cognitive development. No studies included in this review found significant relations with staff experience.

*Relations of Curriculum to Cognitive Development.* Zill et al. (2003) demonstrated that children in classrooms that used the High/Scope curriculum showed significantly improved scores on a pre-reading test in contrast to children in classrooms that used other curricula. No other studies assessed the use of curriculum and their potential relations to cognitive development.

*Relations of Center Financial Practices to Cognitive Development.* Zill et al. (2003) found that teacher salaries were linked to greater gains in pre-reading skills in Head Start programs. While children with teachers in the top quartile of the teacher salary group demonstrated gains of less than one standard score point, children with teachers in the bottom three quartiles for teacher salary actually showed slight, but non-significant, declines in their standard scores. Relations between observational quality and teacher wages may be due to differences in teacher educational background and/or access to and provision of supportive materials to enhance children's learning experiences. In most cases, more highly educated teachers earn higher wages. Further, programs that have greater financial resources are able to provide more learning materials and supplies for teachers to use with young children. Additionally, this may represent a "Hawthorne effect," such that teachers who receive higher salaries feel better about their roles as professionals and therefore adopt positive attitudes that foster strong, positive relationships with their students. Most likely, teacher salary demonstrated some of the strongest relations to cognitive development in preschoolers due to its correlation with other factors, such as teacher education, teacher in-service training opportunities, and greater provision of learning materials.

*Relations of Continuing Education to Cognitive Development.* The NICHD Early Child Care Research Network (2002a) explored relations between child care structure, child care process, and child outcomes using structural equation modeling. The study demonstrated a significant

pathway from participation in training through styles of non-maternal caregiving to child cognitive competence, suggesting a role for continuing education in enhancing caregiver-child interaction, and thus predicting cognitive development.

### Relations from Structural Characteristics to Language Development

*Relations of Pre-Service Teacher Education to Language Development.* Similar to cognitive development, pre-service teacher education had the most consistent relations with children's language development. Four of the six studies that assessed language development demonstrated positive relations with teacher education. In two studies that used the PPVT as the language measure, one found that having an Associate's degree or more in Early Childhood Education was related to increased PPVT scores (Howes, 1997), while the other found that increased PPVT scores were related to teachers having at least a Bachelor's degree in Early Childhood Education (Burchinal et al., 2002). The NICHD Early Child Care Research Network (1999) found that meeting education standards was correlated with higher Reynell scores at 36 months, and for every additional standard met, Reynell scores increased by 2.41 points. Finally, Burchinal et al. (2000) discovered that teacher education correlated .41 with the Expressive scale of the SICD. Kontos and Fiene (1987) and Zill et al. (2003) found no significant relations between teacher education and language development.

*Relations from Teacher:Child Ratio to Language Development.* In the one study that examined teacher:child ratio as a predictor of language development, Phillips et al. (1987) found that teacher:child ratio accounted for 3.5% of the variance in the PLAI (caregiver assessed), 5.4% of the variance in the Adaptive Language Inventory (ALI) (caregiver assessed), and 10.8% of the variance in a free speech assessment.

*Relations between Group Size and Language Development.* Group size did not relate to language outcomes in three studies (Burchinal et al., 2002; Burchinal et al., 2000; Broberg, 1997). However, it is likely that children in groups of larger size more often talk to one another, which does not support language development, to the same degree that conversing with teachers or other adults does. In one study that found the expected relations between these variables, Kontos and Fiene (1987) discovered modest negative relations between group size and language development ( $r = -.22, p = .05$ ) using the TELD.

*Relations of Staff and/or Director Experience to Language Development.* In the one study that examined relations between staff and/or director experience and language development, both director's experience ( $r = -.33, p = .05$ ), and staff experience ( $r = -.20, p = .05$ ) were negatively correlated with language development using the TELD (Burchinal et al., 2002).

*Relations of Curriculum Use to Language Development.* Regarding use of a specific curriculum, Zill et al. (2003) discovered that use of the High/Scope curriculum related to improved gain scores on an oral communication task for Head Start children; thus, use of the High/Scope curriculum may be an important predictor of both cognitive and language development.

*Relations of Center Financial Practices to Language Development.* Zill et al. (2003) showed that the average annual salary of lead teachers was associated with children's oral communication skills.

*Relations of Continuing Education to Language Development.* Burchinal et al. (2002) found that training was related to increased PPVT performance.



## Relations from Structural Characteristics to Social Development

*Relations of Pre-Service Teacher Education to Social Development.* Three of five studies showed relations between pre-service teacher education and child social relations. Howes (1997) reported that teachers with a Bachelor's degree or higher in Early Childhood Education or a CDA had children who demonstrated the most complex play with peers. The NICHD Child Care Research Network (1999) found that sites that met standards for teacher education had children with fewer problems on the CBCL, and an increase of 1 additional standard being met related to .84 fewer points on the CBCL. Finally, structural equation models demonstrated an indirect path from teacher education through caregiving to scores on the caregiver-rated California Preschool Social Competence Scale but not to maternal-rated social competence (NICHD Early Child Care Research Network, 2002a). However, two studies showed no relation between teacher education and social development (Howes, 1997; Zill et al., 2003).

*Relations from Teacher:Child Ratio to Social Development.* Phillips et al. (1987) found that teacher:child ratio related positively to parent reports on the CBI-Considerateness scale; however, ratio also related positively to the caregiver rated PBQ-Anxiety scale, which suggested that ratio may exert both beneficial and deleterious influences on social development. According to the parents, the children may demonstrate more consideration for others; however, caregivers identify these children as exhibiting more anxiety in the center environment. Perhaps, teachers with fewer children are better able to identify some internalizing behavior problems that would not be noticed when caring for larger groups of children.

*Relations between Group Size and Social Development.* No studies included in this review revealed significant findings related to group size.

*Relations of Staff and/or Director Experience to Social Development.* While none of the studies showed relations from staff experience to social development, several studies discovered relations from director experience to children's social skills. Director's experience related positively to CBI-Considerateness, Dependence, and Sociability but also positively to PBQ-Aggression, Hyperactivity, and Anxiety (Phillips, McCartney & Scarr, 1987). Additionally, Kontos and Fiene (1987) discovered that director's experience negatively related to CBI-Sociability. Thus, relations between director's experience and children's social competence remain unclear.

*Relations of Curriculum to Social Development.* Zill et al. (2003) discovered compelling evidence for relations between use of a curriculum and social skills development. Children in classrooms that used the High/Scope curriculum made greater gains on a "Social Awareness" measure. Additionally, these children showed higher gains in cooperative classroom behaviors than children in classrooms in which other curricula were used. With regards to hyperactive behaviors, children in classrooms using the High/Scope curriculum demonstrated significant declines on the Hyperactive scale of the Problem Behavior Rating scale compared to children in classrooms using other curricula.

*Relations of Center Financial Practices to Social Development.* In the only study that examined relations between teacher salaries and social development, Zill et al. (2003) evidenced significant associations. Children in programs with teachers who had higher salaries made greater gains on a "Social Awareness" measure. Furthermore, these children showed higher gains in cooperative

classroom behaviors than children in programs with lower teacher salary levels. With regards to hyperactive behaviors, children with teachers in the top quartile of the salary range demonstrated an average decline of .35 points on the Hyperactive scale of the Problem Behavior rating scale, whereas children with teachers in the lowest quartile showed no change. It is interesting to note that these relations were not evident between teacher education and social skills ratings. Although it is generally the case that teachers with higher wages have more education, educational experience does not appear to explain the associations between wages and social competence in Head Start programs. Instead, it may be the access to educationally supportive materials that exerts the influence on these variables. Also, given the parental role of stress, it may be that the teachers with higher wages experience less stress in their teaching role, which thereby supports children's social development.

*Relations of Continuing Education to Social Development.* As mentioned previously, the NICHD Early Child Care Research Network (2002a) explored relations between child care structure, child care process, and child outcomes using structural equation modeling. The study demonstrated a significant pathway from participation in training through styles of non-maternal caregiving to child social competence, suggesting a role for continuing education in predicting social skills development.

#### Summary of Relations between Structural Characteristics and Child Outcomes

In summary, this review found that of all the structural characteristics explored, *teacher pre-service education most consistently, albeit modestly, related to cognitive and language development.* Relations between pre-service teacher education and social development existed but were not as consistent and strong as relations to cognitive and language skills. For cognitive

development, multiple studies also found relations with teacher:child ratio and group size, but teacher:child ratio and group size were not consistently related in beneficial ways to language and social development. This is likely due to states employing stronger regulatory standards to govern ratio and group size. In most cases, single studies included in this review found relations between curriculum use, continuing education, and center financial practices to school readiness outcomes; thus, additional research is needed to replicate those findings. For continuing education, future studies may need to examine how specific types of training experiences relate to child outcomes. It is likely that particular types of training experiences may help teachers apply instructional techniques that support different aspects of child development and school readiness. Director and/or staff experience evidenced negative or no relations to child outcomes in the single studies included in this review. Due to a lack of studies examining best practices in child care and relations to child outcomes, the review was unable to explore potential relations between use of developmental assessments, provision of parent involvement activities, purposeful teaching of discrete sets of skills to young children, participation in school transition activities, and accreditation status as they may relate to school readiness outcomes.

Nonetheless, there is reason to believe that there may be relations between the best practices conventions and school readiness outcomes. In particular, parent involvement in child care and smooth transitions to school have been found to relate to positive academic outcomes for children. For instance, Clements, Reynolds, and Hickey (2004) found significant relations between parent involvement in their child's preschool and kindergarten performance on a word analysis task and eighth grade reading skills. This suggests that sites that provide ample opportunities for parent involvement and have effective strategies to encourage parent participation may have children who demonstrate higher cognitive skills. Further, Early et al.

(2004) found that children who experienced a seamless transition to kindergarten showed positive achievement, which was particularly evident in children from low-income families. Centers that prepare families for the transition to kindergarten and provide opportunities to bridge the worlds of early and public education are likely to promote better adjustment and academic achievement in kindergarten. On the other hand, Hirsh-Pasek (1991) found that children whose mothers were highly academically oriented and who were placed in highly academic preschool environments evidenced slightly less creativity, more test anxiety, and more negative attitudes toward school compared to children raised in environments where adults placed less emphasis on direct academic instruction in the early years. In this case, programs that force children to learn a discrete set of academic skills may have children who exhibit some social development concerns.

#### RELATIONS FROM STRUCTURAL CHARACTERISTICS TO CLASSROOM QUALITY (Figure 1 #2)

While there were some relations demonstrated between structural characteristics and child outcomes, a number of studies provide evidence of relations between structural characteristics and measures of classroom quality. Because there are more studies addressing this issue, this next part of the review focuses on identifying the particular types of classroom quality measures that demonstrate the most consistent relations. Again, studies selected for inclusion in this review primarily examined relations between structural characteristics and quality in child care center classrooms for 3- to 6-year-olds. Measures of classroom quality used in the studies are listed in Table 3.

### Relations of Teacher Pre-Service Education to Quality

A number of the studies revealed that teacher education has consistent relations to quality. Although most of the correlations and the explained variance were modest in size, teacher education (including studies using observed membership in professional organizations, having a child-related major, and percentage of staff with a Bachelor's degree that will be treated as equivalent with teacher education in this review) showed the most consistent relations of all the structural predictors to observational measures of quality (Scarr et al., 1994; Burchinal et al., 2000, Phillips et al., 2000, Holloway et al., 2001, Burchinal et al., 2002; Holloway et al., 2001; Dunn, 1993; Zill, Resnick, Kim, O'Donnell, Sorongon et al., 2003). Burchinal et al. (2000) found the strongest and most significant associations ( $r = .64$ ,  $p = .001$ ) with a combined ECERS and Infant/Toddler Environment Rating Scale measure in their study of center care for 89 African-American children, which defined education as total years of education. Holloway et al. (2001) found more modest yet significant relations ( $r = .32$ ,  $p = .01$ ) for a 6-level categorization of teacher education and ( $r = .24$ ,  $p = .05$ ) for membership in a professional organization. Similarly, Scarr et al. (1994) reported a modest correlation ( $r = .37$ ) between a six-level categorization of teacher education and ECERS scores. Citing effect sizes of .33 - .54, Burchinal et al. (2002) found that the highest level of education on a four-level definition predicted ECERS total score. In a study of Head Start, Zill, Resnick, Kim, O'Donnell, Sorongon et al. (2003) observed that teachers with higher levels of education tended to be in classrooms with higher ECERS total scores and ECERS Language subscale scores. Thus, these studies suggest that teacher education at least modestly relates to observational quality - regardless of whether teacher education is categorized into levels or defined continuously as years of education.

**Table 3: Description of Measures of Classroom Quality**

<b>Measure</b>	<b>Description</b>
Early Childhood Environment Rating Scale (ECERS-R)	Forty-three items judged by early childhood professionals to be extremely important components of quality programs for young children; items rated on a 7-point scale (1 = inadequate; 3 = minimally acceptable; 5 = good; 7 = excellent) and focus on seven areas of quality. The percentage of agreement across the scale is 86.1%, with no item having an indicator agreement level below 70%. Correlations between two observers were .921 product moment correlation (Pearson) and .865 rank order (Spearman) with an interclass correlation of .915 (Harms, Clifford & Cryer, 1998).
Observational Record of the Caregiving Environment (ORCE)	Focuses on a caregiver's behavior with a specific child rather than on what generally happens in the environment; observers record frequencies of specific behaviors and make qualitative ratings of a caregiver's behavior.
Caregiver Interaction Scale (CIS)	A 26-item measure of caregiver sensitivity with items divided into four subscales (permissive, harshness, detached, and harshness/sensitivity); items scored on a four-point scale.
Adult Involvement Scale (AIS)	A measure of caregiver responsiveness to a boy and girl calculated as the percentage of time the caregiver is at least minimally responsive to the children.
Child Development Program Evaluation – Indicator Checklist (CDPE-IC)	A 15-item scale comprised of the best predictors of the total score from the 270-item full scale with each item representing a regulation and scored as pass/fail.
Caregiver Observation Form and Scale (COFAS)	Consists of 29 caregiver behaviors that are observed and coded during a 20-minute interval; score ranges from 130 – 1560 and is obtained by multiplying the designated weight of each behavior by its frequency and summing.
UCLA Early Childhood Observation Form (ECOF)	A 24-item scale that assesses teaching style; scale is scored from 3- to 5-points representing the continuum from didactic to child-centeredness.

However, two studies (Dunn, 1993; Kontos & Fiene, 1987) showed weak or no relations between teacher education and ECERS scores. Although Dunn (1993) found no relations using years of education, she did find a modest, albeit non-significant, relation between child-related major and observational quality ( $r = .31$ ). Kontos and Fiene (1987) found a slightly negative ( $r = -.12$ ) relation between percentage of staff with a Bachelor's degree and ECERS score. In both of these studies, the number of cases was fairly small. Dunn (1993) examined only 24 centers that included 30 classrooms, and Kontos and Fiene (1987) studied only 10 centers. Due to the small sizes of these studies, the use of continuous measures to examine teacher education may have resulted in too little statistical power to detect meaningful differences. Furthermore, Kontos and Fiene (1987) used the center as the unit of analysis whereas the other studies used classrooms. Kontos and Fiene (1987) may have found the slightly negative relations because they collapsed several classrooms together, lumping classrooms with highly educated staff together with those having lower education to develop a center average.

Although the latter two studies showed no relations between teacher education and observed quality, Cassidy, Buell, Pugh-Hoese, and Russell (1995) demonstrated clear relations between increased teacher education and classroom quality. These researchers studied a sample of teachers in child care centers who had no college experience as they entered a program to earn an Associate's degree in Early Childhood Education or Child Development. The degree program was fairly rigorous, requiring that the teachers complete at least 12 to 20 credit hours during each year in the program. Using a combined measure of ECERS and ITES as the dependent variable, ANCOVA analyses demonstrated significant differences in quality scores between the teachers in the scholarship program compared to a control group. This study provided clear



support for the strength of relation between teacher education and observed quality, particularly for teachers who participate in college level coursework.

A potential mechanism by which teacher education relates to observational quality was suggested by Zill, Resnick, Kim, O'Donnell, Sorongon et al. (2003). In this study of Head Start, the researchers discovered that the relationship between teacher education and quality was explained by teachers' attitudes and knowledge of developmentally appropriate early childhood education practices. Specifically, more educated teachers had more positive attitudes and knowledge, which led to higher quality classrooms.

Thus, with the exception of the two studies that employed small sample sizes and/or focused on the center as the unit of analysis rather than classrooms, there is consistent support for relations between teacher education and observational quality. Teacher education will be an important structural characteristic to examine for strength of prediction through classroom quality to school readiness.

#### Relations from Teacher:Child Ratio to Quality

Relations between teacher:child ratio and classroom quality were mixed mostly because teacher:child ratio is highly regulated so there is less variability among centers. In the seven studies that examined ratios, three different ways of presenting the ratio information were used (Dunn, 1993; Scarr et al., 1994; Burchinal et al., 2000; Phillips et al., 1987; Kontos & Fiene, 1987; Phillips et al., 2000; Burchinal et al., 2002). Burchinal et al. (2000) and Kontos and Fiene (1987) found strong negative relations ( $r = -.58$  and  $r = -.47$ ), and Phillips et al. (2000) found a multivariate model that included ratio to account for 33% of the variance in ECERS score. Meanwhile, Scarr et al. (1994) found an insignificant yet moderate positive correlation ( $r = .36$ )

between teacher:child ratio and quality. Three other studies demonstrated low, insignificant correlations (Dunn, 1993; Phillips et al., 1987; Phillips et al., 2000). Thus, teacher:child ratio seems to have only low relations to quality, most likely due to regulatory restrictions decreasing variability across sites.

Nonetheless, there was some evidence that teacher:child ratio is more important as a quality marker for infants and toddlers than for preschoolers. The NICHD Early Child Care Research Network (2000c) found that teacher:child ratio significantly predicted the score on the Observational Record of the Caregiving Environment (ORCE) for infants and toddlers but not for three-year-olds. Since the current study focuses only on preschool-aged children, teacher:child ratio may be less important as a structural predictor of classroom quality.

#### Relations between Group Size and Quality

In the studies included in this review, examinations of relations between group size demonstrated some of the most highly divergent findings, ranging from modest positive to strongly negative relations. Part of the difficulty in addressing relations between these variables and classroom quality was that, similar to teacher:child ratio, group size has been more highly regulated than some of the other structural predictors. Thus, there may be less overall variability among centers, making the findings from a few aberrant centers stronger in certain circumstances – sometimes leading to positive relations and other times to negative relations.

In studies of group size, Dunn (1993) and Kontos and Fiene (1987) found positive relations between group size and center quality, while Burchinal et al. (2000) and Holloway et al. (2001) found significantly negative relations between group size and classroom quality. The average age of the children in the centers for the former two studies was greater than 51 months,

and the average group sizes were greater than 21 children. In Burchinal et al. (2000), the classrooms were for 3-year-olds, and the average group size was 13.7. In Holloway et al., (2001), child age was not disclosed, and the average group size was 17.34. This suggests that the studies that observed mostly older preschoolers in large groups demonstrated positive relations between group size and quality, whereas centers with younger children in smaller groups evidenced negative relations. Increasing group size appeared to have a greater negative impact on observed quality for younger preschoolers. One hypothesis for these findings may be that teachers of older preschoolers tended to be better educated than were teachers of younger children (Phillips et al., 2000). In fact, French nursery schools counterbalance education and group size, permitting classrooms with larger group sizes but requiring higher educational standards for teachers compared to American preschools. Another hypothesis is that group size is more critical for infants and toddlers that require more routine types of care, such as feeding and diapering, than for older children. So, the younger infants and toddlers require more adult attention to permit time for cognitively and linguistically stimulating interactions in addition to routine care.

#### Relations of Staff and/or Director Experience to Quality

Although demonstrating fewer significant relations, the reviewed studies found that staff and director experience positively related to observational quality. Phillips et al. (1987) and Kontos and Fiene (1987) demonstrated modest correlations between director experience and ECERS scores ( $r = .46$  and  $r = .32$ ). In studies of staff experience, correlations ranged from .15 to .31 (Dunn, 1993; Kontos & Fiene, 1987; Holloway et al., 2001). In Head Start, Zill et al (2003) noted that teachers who had more teaching experience had higher quality as measured by the ECERS and higher sensitivity and responsiveness as measured by the Caregiver Interaction

Scale. In one study that used regression analyses, staff experience was not included as a significant predictor of classroom quality (Burchinal et al., 2002). Pulling this set of findings together, director experience may serve as an important predictor of observational quality; however, staff experience seems to be less useful as a predictor of quality. Still, it is important to note that there was a paucity of findings for direct relations between director and/or staff experience and child school readiness outcomes.

#### Relations of Center Financial Practices to Quality

Strong and significant relations were found between wages and centers providing resources for training for three of the four studies examining this structural predictor (Scarr et al., 1994; Phillips et al., 2000; Holloway et al., 2001). Scarr et al. (1994) reported a correlation of .59 between highest wage paid to caregivers and ECERS score in a study of 363 centers. Furthermore, Phillips et al. (2000) found that wages significantly predicted ECERS score even after controlling for site, ratio compliance, group size and teacher:child ratio, and teacher education and training. Finally, Holloway et al. (2001) discovered that a categorical definition of centers providing resources for training modestly and significantly related to ECERS score ( $r = .31, p = .01$ ). In the only study that found no significant relations between teacher salary and quality (Zill et al., 2003), the sites studied were Head Start centers; therefore, there may have been less variability in salaries due to federal oversight compared to the child care centers examined in the other studies. Thus, there seems to be strong support for the relation between center financial variables, such as wages and resources provided for training, and classroom quality.

### Relations of Curriculum Use to Quality

Only two studies contained in this review addressed the use of a curriculum and relations to observational quality. Zill et al. (2003) noted that classrooms that used the High/Scope or the Creative Curriculum had significantly higher ECERS quality than did classrooms that used some other kind of curriculum. Similarly, Fiene, et al. (2002) showed that child care centers that reported using a curriculum achieved an average score of 4.1 on the ECERS, whereas centers that did not report using a curriculum achieved average scores of 3.7 – a significant difference. Since both of these studies found significant relations, curriculum use will be an important structural predictor to examine in this study.

### Relations of Continuing Education to Quality

Four studies showed relations between training and ECERS scores (Scarr et al., 1994; Holloway et al., 2001; Burchinal et al., 2002; Phillips et al., 2000). Holloway et al. (2001) demonstrated that training modestly and significantly predicted ECERS score ( $r = .37, p = .001$ ) and that having a continuing education requirement for staff with less than an Associate's degree also significantly predicted observed quality ( $r = .32, p = .01$ ). Scarr et al. (1994) also discovered modest relations ( $r = .35$ ) between training, on a 5-level scale ranging from no training to college or graduate level training experiences, and the ECERS. Furthermore, Burchinal et al. (2002) revealed that workshop attendance was one of two variables that predicted a combined ECERS score (combined with the Infant/Toddler Environmental Rating Scale). Discovering age-related differences, Phillips et al. (2000) found that participation in training was part of the regression equation that significantly predicted observational quality in infant and toddler classrooms but not in preschool classrooms. Observational quality in infant and toddler classrooms was

associated with a wider array of structural variables than in preschool classrooms. It may be that the influence of training was less strong in preschool classrooms because the preschool teachers tended to be more highly educated with less variation and tended to participate in more training opportunities with less variation than infant and toddler teachers.

Although the aforementioned studies of training evidenced significant relations, Dunn (1993) found an insignificant yet weakly positive relation between training and ECERS scores. As mentioned previously, the Dunn (1993) study had a fairly small sample size. Additionally, the study measured training using a 7-level scale that assessed the educational level of any training opportunity that the caregiver had experienced in her life (e.g., high school courses, CDA training, etc.). As such, this assessment of “training” differed from the other studies that found modest, positive correlations when using participation in recent training opportunities.

While most of the studies examining training as a structural predictor used the ECERS, one study examined relations between the Observational Record of the Caregiving Environment (ORCE) and nonmaternal caregiving. The NICHD Early Child Care Research Network (2002a) looked at the relations between child care structure, child care process, and child outcomes using structural equation modeling. The study revealed a significant pathway ( $r = .17, p < .001$  in a model predicting child cognitive competence and  $r = .19, p < .005$  in a model predicting child social competence) from participation in training to styles of non-maternal caregiving, providing further evidence that training can impact styles of caregiving among child care providers. Taken together, this set of studies suggests modest relations between participation in training and observational quality, which should be further explored in this study.

### Relations between Provision of Parent Involvement Activities and Quality.

No studies directly examined provision of parent involvement activities and relations to quality. However, Castro et al. (2004) found that classroom quality was a strong predictor of parent involvement in Head Start programs. Although all Head Start programs are mandated by their Performance Standards to provide parent involvement activities, this suggests that high quality programs may be more likely to attract parent participation.

### Relations between Provision of Transition Activities and Quality

None of the studies included in this review directly explored relations between transition activities and quality. Still, there is evidence that there may be relations between this structural characteristic and quality. Nelson (2004) reported that kindergarten teachers certified in Early Childhood Education were more likely to shorten the school day to aid transition for students, to invite parents to visit the classroom, and to conduct orientation sessions for parents. Since relations have been found in the previous section between teacher pre-service education and quality, it can be extrapolated that more highly educated child care center teachers would provide more transition activities, suggesting associations between transition activities and center quality.

### Relations between Accreditation and Quality

Zan (2005) explored relations between National Association for the Education of Young Children accreditation, quality of the preschool curriculum, and quality. In this study of 116 classrooms, the mean score on the ECERS was 5.77 – higher than national averages for preschool classrooms; however, classrooms ranged in quality from 3.45 – 6.79. This suggests that being accredited does not necessarily mean that a program is “high quality.”

### Relations from Other Structural Characteristics to Quality

Two additional studies observed relations between constellations of structural variables and classroom quality. Rao et al. (2003) sought to predict quality in Chinese preschools and used a questionnaire, the Program Assessment Scale, to measure relations. The Program Assessment Scale was composed of three scales – Structural Measures, Management-Related Measures, and Process Quality. The Structural scale included space, physical environment, staff qualifications, and teacher:child ratio. The Management scale included fringe benefits, staff appraisal system, staff-parent interaction, and evaluation format. The Process Quality scale included teacher-child interaction, guidance from staff, children's affect in the class, and child-friendly routine tasks. The Structural and Management scales accounted for 27% of the variance in Process Quality.

Also, Holloway et al. (2001) attempted to develop an interview to assess observational quality to make data collection easier and more useful for regulatory bodies. Specifically, Holloway et al. (2001) developed a telephone interview to assess quality in child care centers and family day care homes that was drawn directly from characteristics assessed in the ECERS or the Family Day Care Rating Scale (FDCRS). Focusing on the centers, a 22-item inventory explained 51% of the variance in observed ECERS score. Furthermore, the telephone interview accurately predicted 89% of centers as “poor,” “mediocre,” or “developmentally appropriate.” In responding to the findings of this study, Caldwell (2001) reported that “a reliable and valid telephone interview would be of immense value for the group charged with demonstrating that all existing programs achieve at least a minimal quality level.... this group would profit the most from such a procedure.” Furthermore, such a procedure could be used in homes or centers that do not welcome the intrusion of visitors (Ponder, 2001). Clearly, there may be value in identifying structural indices (i.e., use of an interview format) that accurately predict observed quality.



Finally, Wishard, Shivers, Howes, and Ritchie (2003) explored relations between observational quality and specific teaching practices, potentially helping future studies to elucidate the mechanisms by which structural variables can impact child outcomes. The researchers examined observational quality, defining “emotional climate” through a combination of the Caregiver Interaction Scale and the Adult Involvement Scale, “teacher involvement” through the Adult Engagement Scale, and “process quality” through a one-factor construct drawn from a factor analysis of the ECERS. They then related the observational measures to specific teacher practices, such as positive relations and basic education and care, and to program practices, such as provision of family services and orientation toward preparation for school. The results showed that lower quality was associated with more time spent on routine activities. Quality was positively related with all aspects of teacher practices except Care and Education practices and Routine practices. Quality was negatively related to these latter practices.

#### Summary of Relations from Structural Characteristics to Quality

In summary, this review found evidence of relations between specific “regulable” structural characteristics and classroom quality in particular, and these relations have been demonstrated for child care centers in other cultures. Specifically, there was consistent support for modest to strong relations between teacher education, participation in training opportunities, financial strength of centers (e.g., wages and provision of resources for training), and use of curriculum with classroom quality. Financial strength of centers and use of curriculum may have demonstrated influences because of their potential overlap with teacher education and training. Specifically, better financed centers may be able to attract and retain more highly qualified

teachers. Similarly, programs that invest in implementing a curriculum may be more likely to invest in teacher education and/or training to be able to effectively implement that curriculum.

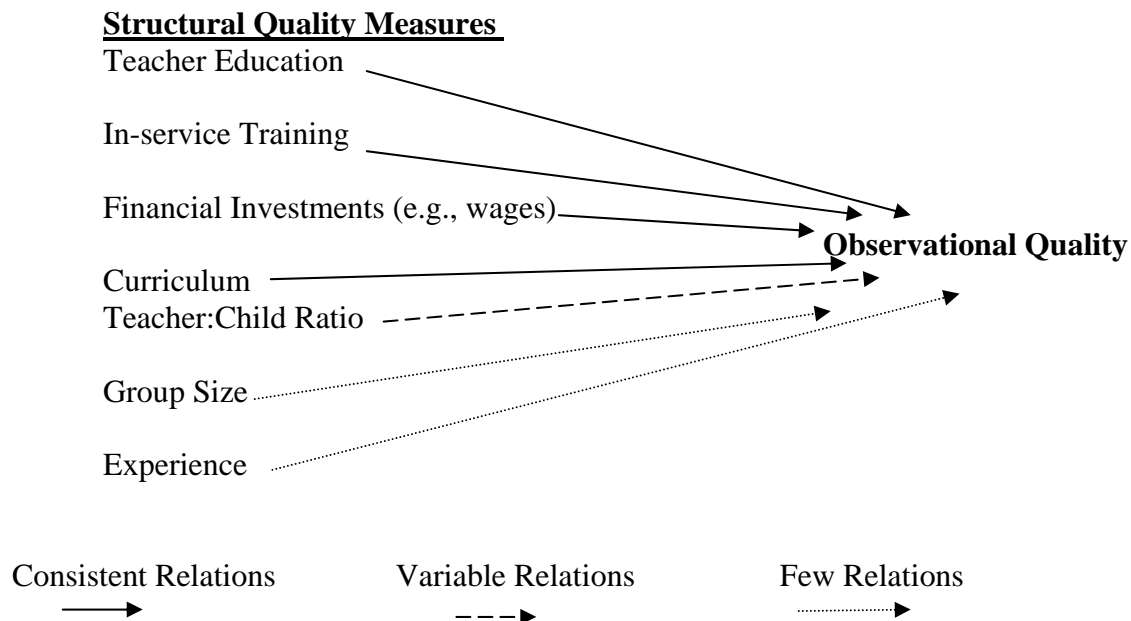
Director experience, staff experience, teacher:child ratio, and group size demonstrated mixed findings. Evidence existed, but was not as strong, for relations between director and staff experience and classroom quality. Teacher:child ratio and group size relations were less consistent, partially because these structural predictors generally receive greater regulatory attention in state licensing practices. Additionally, teacher:child ratio and group size provide a context in which teachers can implement effective teaching practices (Love et al., 1996) rather than directly relating to classroom quality. No research that met the selection criteria for inclusion in this review addressed direct relations between best practices conventions (e.g., use of developmental assessments, skills taught to children, parent involvement, transition to school activities, or accreditation) and quality. However, single studies provided promising evidence that there would be relations for provision of parent involvement and transition activities and for accreditation status. Overall, this review of literature provided clear evidence that specific types of teacher and program practices predicted classroom quality.

### MEASURES OF QUALITY THAT RELATE TO CHILD OUTCOMES (Figure 1 #3)

Drawing from the review of structural predictors and their relation to quality and to child outcomes, the following relations have been identified (see Figure 2):

- Pre-Service Teacher Education consistently predicted quality and child school readiness outcomes.

- Teacher:Child Ratio demonstrated mixed relations to quality primarily because of regulatory practices that constrained extreme variations in teacher:child ratio.
- Group Size showed highly variable relations to quality, ranging from modestly positive to strongly negative relations. Because group size is highly regulated, it is likely that this restricted variability and diminished the likelihood of finding consistent relations.
- Staff and/or Director Experience showed fewer significant relations but sometimes did predict quality.
- Center Financial Practices illustrated strong predictive relations to quality in the few studies that examined associations.
- Curriculum Use had evidence of positive relations to quality; however, few studies examined the variable.
- Continuing Education consistently and moderately predicted quality.



**Figure 2: Relations between Structural Characteristics and Observational Quality Measures**

Relations between structural characteristics and child outcomes and between structural characteristics and classroom quality were reviewed and summarized above. Yet, a question remains as to whether there is evidence of significant relations between classroom quality and child outcomes. Although the review of structural characteristics and relations to quality identify certain quality measures that more often show significant relations, it is still necessary to identify the independent variable for the present study that has most often related to child outcomes. This review is needed to bolster the findings found in the few studies that directly observed structural characteristics and their relations to child outcomes.

There is a wealth of research that has shown relations between child care quality and child outcomes (NICHD Early Child Care Research Network, 2003b). Numerous studies, primarily correlational in nature, have demonstrated relations between observational, or process, quality and children's cognitive, language, and social development. This next section seeks to identify the strength of these relations to draw a picture of how quality child care relates to children's school readiness in terms of cognitive, language, and social development as assessed in children between three- to six-years-old.

The studies included in this review predominately use seven instruments to assess observational quality – the Early Childhood Environment Rating Scale, the Observational Record of the Caregiving Environment, the Caregiver Interaction Scale, the Adult Involvement Scale, the Child Development Program Evaluation – Indicator Checklist, the Caregiver Observation Form and Scale, and the UCLA Early Childhood Observation Form (see Table 3 for brief descriptions).

## Relations with Cognitive Development

Research has provided ample evidence of relations between child care quality and cognitive development, both in intervention studies (Barnett, 1993) and correlational studies (Peisner-Feinberg & Burchinal, 1997; Peisner-Feinberg et al., 2001). Measures of cognitive development included IQ tests (e.g., WISC, Stanford Binet), achievement tests (e.g., Woodcock-Johnson Tests of Achievement), and observational assessments of play activities to capture a full spectrum of behaviors that demonstrate cognitive competencies for young children. Although some studies combine language and cognition into one category (i.e., the NICHD Early Child Care Research Network, 2002a treated results on the Preschool Language Scale as part of their cognitive assessment), this review separates them because of the potentially different aspects of quality (e.g., divergent and elaborative interactions vs. verbal interactions more generally) that may relate to these two child outcomes.

*Relations between the Early Childhood Environment Rating Scale (ECERS) and Cognitive Development.* Twelve studies meeting the aforementioned criteria for inclusion in this review examined relations between the ECERS - either singly or as a composite of quality caregiving - and cognitive outcomes. Eight of these studies demonstrated positive relations. Two studies that merely used correlational analyses evidenced modest correlations of  $r = .3$  when assessing cognitive development using the Classroom Behavior Inventory (CBI) (Dunn, 1993) and the Bayley Scales of Mental Development (Burchinal et al., 2000), suggesting moderate relations between observational quality and more traditionally used measures of cognitive development. Burchinal et al. (2000) found that every 1-point difference on the ECERS related to 6 points on the Bayley. Additionally, Frank Porter Graham – University of North Carolina Smart Start

Evaluation Team (2003) reported significant relations between ECERS and achievement test measures of cognitive development (Applied Problems Scale of Woodcock-Johnson and Concepts About Print) using hierarchical linear modeling (HLM) analyses. The HLM analyses revealed strong relations particularly in the areas of print awareness, book knowledge, and applied math and counting.

Taking the analyses a step further to control for child and family background factors such as income and parent education, two studies demonstrated clear relations between ECERS scores and child performance on the CBI cognitive scales and achievement tests. Using correlational analyses, Peisner-Feinberg and Burchinal (1997) found modest correlations generally with scores on the Woodcock-Johnson-Revised and the CBI, and when they controlled for background factors, they revealed that elevated ECERS scores significantly related to enhanced pre-reading scores. Using regression analyses, Phillips et al. (1987) found that ECERS scores accounted for 21% of the variance in CBI-Intelligence and 14% of the variance in CBI-Task Orientation based on caregiver ratings.

Further, two studies composited ECERS scores with other measures of caregiving quality and still demonstrated modest correlations with achievement scores. Burchinal and Cryer (2003) combined scores on the ECERS, Adult Involvement Scale (AIS), Caregiver Interaction Scale (CIS), and a measure of child-centeredness and found that positive caregiving was associated with increased school readiness. Specifically, they found that for every 1.5-point increase in positive caregiving there was an increase of 0.9 points on WJ-Reading and Math. Peisner-Feinberg et al. (2001) combined the ECERS with the AIS, CIS, and the UCLA Early Childhood Observation Form to form a single composite of quality of classroom practices and found that the composite correlated with WJ-R Math scores ( $r = .17, p = .001$ ). The study also discovered

an interaction between positive caregiving and maternal education such that quality had a stronger impact on the development of children with less educated mothers.

In a Head Start sample, Zill et al. (2003) revealed no relations between the ECERS-Language subscale or the Caregiver Interaction Scale (CIS) and cognitive development. However, the Head Start sample tended to be of uniformly high quality. Of the 43 programs assessed in the Family and Child Experiences Survey for 2000 (FACES 2000), the average score on the ECERS was 4.84 with a standard deviation of .87. Thus, it is likely that the lack of relations found between cognitive development and the ECERS may be due to the restricted range of quality included in the sample. In particular, there were relatively few low quality Head Start sites in the sample compared to the higher quality sites, which may have obscured relations to child outcomes.

Only one study revealed a negative correlation between cognitive development and ECERS score (Kontos, 1991). It is notable that this is the only study that used IQ as the measure of cognitive development. It may be that IQ is less influenced by contemporary learning environments than some of the other measures of cognitive development in preschoolers. Nonetheless, the finding suggests that the observational quality of child care may have an impact on achievement and mental development types of scores without directly relating to the general intelligence of young children.

In summary, ECERS scores consistently demonstrate relations to cognitive development whether assessed via achievement or traditional cognitive development measures, even after controlling for child and family background characteristics. Further, ECERS scores continue to predict cognitive development when used along with other scales as a composite measure of quality.

*Relations between Observational Record of the Caregiving Environment (ORCE) and Cognitive Development.* The only studies that have used the ORCE as the measure for observational quality are those conducted by the NICHD Early Child Care Research Network. With the exception of one study that used structural equation modeling, all the studies included in this review used multiple regression analyses. These studies provide interpretative challenges because they combine both centers and homes in the analyses. However, because the findings are so consistent in identifying effects for center attendance and represent some of the most comprehensive work in terms of controlling for child and family background characteristics, they are included in this review.

First, focusing on effects for three-year-old children using the Bracken to assess cognitive competence, three reports showed relations between ORCE caregiving scores and cognitive competence. Specifically, the NICHD Research Network (2000a) found that the cumulative quality of child care setting from birth to 36 months related modestly but consistently to children's cognitive development at 36 months (as well as at 15- and 24-months), particularly in children who were served in child care centers. The findings did not vary as a function of background variables. Restricting the sample to children eligible for Head Start (i.e., poverty or near-poverty), the NICHD Early Child Care Research Network (2001) found relations between cognitive competence and high quality with no effect of family income. Finally, Burchinal and Cryer (2003) found that a 1-standard deviation increase in quality related to an increase of 4.85 points on the Bracken. Once again, center care quality predicted outcomes for three-year-old children.

At 4.5 years, five reports consistently show relations between classroom quality and cognitive competence. Controlling for family background factors, NICHD Early Child Care



Research Network (2003b; 2002b) found that quality significantly accounted for 2% of the variance in pre-academic skills after controlling for background factors. NICHD Early Child Care Research Network (2004) provided further evidence that center experience related to cognitive competence at 4.5 years after accounting for family background factors. NICHD Early Child Care Research Network and Duncan (2003) reported that a 1-standard deviation increase in the ORCE related to 1.4 to 1.2 points on cognitive measures (e.g., Bayley) and 1.0 to 1.3 points on achievement measures (e.g., WJ-R), and such relations were stronger for children who had initially lower cognitive scores. This suggests that high observed quality child care settings can serve as an intervention for children who exhibit cognitive risks. Finally, NICHD Early Child Care Research Network (2002a) found a significant direct path from caregiving to cognitive competence using structural equation modeling.

Compared to results of studies using the ECERS, the NICHD Early Child Care Research Network generally demonstrates smaller effect sizes because they include family day care homes, the sample spans the entire range of child care environments, and they control for numerous family and demographic factors to obtain estimates of the unique effect of child care experiences on child development (the “total” effect of quality is the unique plus some unknown percentage of the overlap between quality and other factors).

*Relations between Other Quality Measures and Cognitive Development.* Ten studies have used some measure of observational quality other than the ECERS or ORCE, such as the Adult Involvement Scale (AIS), the Arnett, and the Caregiver Interaction Scale (CIS). Four of these studies uncovered significant relations to cognitive competence. Bagnato et al. (2002) used the Program Quality Profile for Early Childhood Settings. The researchers plotted expected development based on performance on the Developmental Observation Checklist System (an

assessment system that includes measures of cognitive and social development) and discovered that the gap between observed and expected DOCS scores increased over time with greater gains experienced by children who participated in high quality care for longer periods of time. Phillips, Scarr, and McCartney (1987) showed that a measure of verbal interactions between teachers and children accounted for a greater amount of the variance in CBI-Intelligence and Task Orientation scores than ECERS scores. The verbal interactions measure accounted for 23.4% of the variance in CBI-Intelligence and 27.9% of the variance in CBI-Task Orientation.

Peisner-Feinberg et al. (2001) found that a measure assessing teacher-child closeness related significantly and positively to CBI-Intelligence. Finally, in a sample restricted to low-income children, Loeb et al. (2004) found that children between the ages of 12 and 42 months performed better on the story and print concepts portions of the Family and Child Experiences Survey (FACES) in child care sites with higher Caregiver Interaction Scale scores. Furthermore, this study showed that children who participated in centers demonstrated higher school readiness skills, as assessed by the Bracken Basic Concept Scale, and the center effect was greater for children residing in the city with the highest average quality rating. Before conclusions can be drawn about the relations between these measures and cognitive competence, additional studies replicating the findings are required; however, the results are in line with the aforementioned studies demonstrating positive relations between child care center quality and cognitive development during the preschool years.

The other six studies that found no relations used the Educational Attitude Scale (Dunn, 1993), the Caregiver Interaction Scale (Howes, 1997), the Adult Involvement Scale (Howes, 1997), the Day Care Environment Inventory (Phillips, McCartney & Scarr, 1987), the Spot Observation Checklist (Broberg et al., 1997), the Child Development Program Evaluation Scale

Indicator Checklist (Kontos & Fiene, 1987), or the Caregiver Observation Form and Scale (Kontos & Fiene, 1987). One potential reason for the number of null findings using these alternative quality measures may be an overall lack of sensitivity in these measures of quality. The CIS in particular has been found to have easily obtained ceiling effects (Fiene et al., 2002). Perhaps, the ECERS and ORCE have greater refinement that detects nuances of teacher behaviors influencing cognitive development in preschoolers.

*Intervention Studies.* Longitudinal intervention studies have demonstrated causal relations between observational measures of quality child care experiences and positive cognitive and academic outcomes in life. Although these studies did not compare high vs. low quality sites, they did compare high quality programs to no participation or participation in other early childhood programs that were generally available in the community and they used quasi-experimental designs rather than naturalistic observations, which permit selection bias and other confounds to influence the results.

For example, the Abecedarian project provided a high quality intervention for low-income minority children. Using traditional IQ tests (e.g., Stanford-Binet, WPSSI, and the WISC), Campbell et al. (2001) found that children who participated in the high quality preschool intervention program demonstrated higher IQ than controls from 4 – 8 years of age and also demonstrated higher reading and math scores on WJ Tests of Achievement. Results based on studies following the participants through 21 years found that the children who participated in the intervention had higher scores on cognitive and academic tests through 21 years of age, demonstrating moderate to large treatment effects (Campbell et al. 2001).

In a cost-benefit analysis of the Perry Preschool Project, Barnett (1993) found that the benefit of the program was \$108,200 after following the participants' development through 27

years of age compared to a cost of \$12,356. Outcomes that were associated with the \$95,000 value of the project included increased achievement scores at 9 and 14 years, reduced special education placement, increased graduation from high school, increased employment at 19 years, increased earnings at 28 years, reduced arrest at 19 years, and reduced receipt of Welfare at 19 and 28 years. Thus, high quality early care and education programs produced in quasi-experimental designs long-term improvements in cognitive development and school performance, and post-secondary employment for children who were at risk for cognitive delays and school failure relative to comparable peers who were not exposed to the intervention program. Thus, high quality early care and education programs can causally produce improved child outcomes, lending some credence to the task of improving quality as a strategy that will produce better child outcomes.

*Summary of Relations between Quality and Cognitive Development.* Across numerous studies, quality relates fairly consistently, although modestly, to cognitive competence. A subset of studies show larger relations for children from at-risk backgrounds (e.g., poverty or minority status). By far, studies using the ECERS and the ORCE tend to demonstrate the most consistent relations with cognitive development, whereas studies using other measures of quality tend to report no significant relations. Because use of the ORCE is restricted to only the NICHD Early Research Network set of reports, it is recommended that the ECERS be considered as the independent measure for this study based on the strength of its relations to cognitive development in a variety of studies.

### Relations with Language Development

The studies included in this review for the prediction of language development primarily used the ECERS, the Caregiver Interaction Scale (CIS), the Adult Involvement Scale (AIS), and the ORCE to assess observational quality. Measures of language development include the Peabody Picture Vocabulary Test (PPVT), the Sequenced Inventory of Communication Development (SICD), the Reynell Developmental Language Comprehension Scale (Reynell), the Preschool Language Assessment Instrument (PLAI), a free speech rating, the Test of Early Language Development (TELD), and the Adaptive Language Instrument (ALI).

*Relations between the Early Childhood Environment Rating Scale (ECERS) and Language Development.* The predominant dependent measure used in studies observing relations between the ECERS and language development was the Peabody Picture Vocabulary Test (PPVT). All studies that used the PPVT, administered when children were between three and six years, showed positive relations. Three correlational studies demonstrated modest relations between the PPVT and a composite that included the ECERS along with the Adult Involvement Scale (AIS), Caregiver Interaction Scale (CIS), and other observational measures (Peisner-Feinberg et al. 2001; Burchinal & Cryer, 2003; Peisner-Feinberg & Burchinal, 1997). A standard deviation increase in quality (1.5) was associated with a 2.8 point increase in the PPVT score in one study (Burchinal & Cryer, 2003), and an increase of 2 points in quality was associated with a 4 point increase on the PPVT in another study (Peisner-Feinberg & Burchinal, 1997). Furthermore, Peisner-Feinberg & Burchinal (1997) found that when they controlled for child and family background a combination of higher quality and closer teacher-child relationship related to higher language skills. Phillips et al. (1987) showed that ECERS score accounted for 3.3% of the

variance in PPVT results. Finally, Frank Porter Graham University of North Carolina Smart Start Evaluation Team used Hierarchical Linear Modeling procedures and found that ECERS score predicted receptive language skills regardless of poverty status or ethnicity. Taken together, ratings using the ECERS fairly consistently, although modestly, correlated with PPVT measures of language development.

With the exception of studies using the Test of Early Language Development and the Adaptive Language Inventory (Kontos & Fiene, 1987; Kontos, 1991), studies that used other language development instruments usually demonstrated positive relations between ECERS quality and language skills. Phillips et al. (1987) found that the ECERS significantly accounted for 4.8% of the variance in PLAI score and 20.3% of the variance in a rating of free speech. Burchinal et al. (2000) found correlations with the SICD of .14 ( $p = .05$ ) for receptive language and .49 ( $p = .001$ ) for expressive language. The lack of positive relations found in the Kontos and Fiene (1987) and the Kontos (1991) studies may have been due to the restricted range of quality contained in the sample. The lowest quality sites in these studies fell in the “adequate” range of quality, which may have attenuated the ability to detect developmental differences.

*Relations between Observational Record of the Caregiving Environment (ORCE) and Language Development.* Five reports included in this review examined relations between ORCE quality and language development. In four of the reports, the dependent variable was the Reynell Developmental Language Comprehension Scale (Reynell), assessed in 3-year-olds, and in two studies the dependent variable was the Preschool Language Scale assessed in 4.5-year-olds.

In all studies of 3-year-olds with the Reynell, there were positive relations between quality and language development in this sample of child care providers that included home providers. In studies that looked at outcomes among low-income children, the ORCE predicted

Reynell outcomes when there was high quality and lower SES (NICHD Early Child Care Research Network, 2000b) and when the sample was in poverty or near-poverty status (NICHD Early Child Care Research Network, 2001), suggesting stronger language effects for children deemed “at-risk” on the basis of income. Effect sizes for the relation between the ORCE and the Reynell have been found to be 2.03 points on the Reynell for a 1 standard deviation increase in quality (Burchinal & Cryer, 2003). Finally, associations between particular aspects of the ORCE and language outcomes for children in centers have been demonstrated. Specifically, teacher language stimulation has been discovered to relate to improved expressive language for children participating in centers (NICHD Early Child Care Research Network, 2000a).

In the two studies addressing outcomes at 4.5 years, both found relations between observational quality and language development for children in center care environments rather than homes. The NICHD Early Child Care Research Network (2002b) revealed that children in center care displayed better language skills as assessed by the Preschool Language Scale (PLS). Taking the analyses a step further, the NICHD Early Child Care Research Network (2004) discovered that children who had experienced more hours in center care as toddlers exhibited higher language scores on the PLS whereas those exposed to more center care as infants exhibited lower scores. Although this last study demonstrated effects varying by age of the child, generally the ORCE exhibited consistently positive relations with measures of language development.

*Relations between Other Quality Measures and Language Development.* Five studies examined relations between other measures of observational quality and language outcomes with mixed results. In the study using the Caregiver Interaction Scale (CIS) or the Adult Involvement Scale (AIS), no relations were found (Howes, 1997). In two studies using the Child Development

Program Evaluation Scale (CDPE), one found no relations to language skills (Kontos, 1991) while the other found positive relations to a rating of child free speech (Kontos & Fiene, 1987). Broberg et al. (1997), which used the Spot Checklist to assess quality of care, demonstrated positive relations with verbal abilities for Swedish 8-year-olds in centers. Kontos (1991) related the Caregiver Observation Form and Scale (COFAS) to the TELD and found positive relations whereas Kontos & Fiene (1987) related the TELD to the COFAS and found negative relations. These findings are difficult to interpret given that the sample appears to be the same for both studies; thus, they can be deemed inconclusive. Compared to the ECERS and the ORCE, fewer systematic relations have been found between these other types of quality measures and language development outcomes.

Several of these studies specifically examined adult verbal interactions and found relations to child language development. Phillips et al. (1987) found positive relations between verbal interactions and a measure of free speech, verbal interactions accounting for 15.3% of the variance in the free speech ratings, and also between verbal interactions and the Adaptive Language Inventory (ALI), accounting for 19% of the variance.

*Summary of Relations between Quality and Language Development.* Generally, observational quality relates to better language development, especially when quality is measured using the ECERS or the ORCE but less consistently when using the AIS or CIS. Similar to findings regarding cognitive development, the ECERS and the ORCE appear to have the strongest predictive relations to language development.



### Relations with Social Development

Seventeen studies are included in this review to identify measures demonstrating relations between child care quality and social development. Again, the studies primarily used the ECERS, the Caregiver Interaction Scale (CIS), the Adult Involvement Scale (AIS), and the ORCE to assess observational quality. Measures of social development primarily included the Classroom Behavior Inventory-Sociability (CBI-Sociability), the Problem Behavior Questionnaire (PBQ), the Child Behavior Check List (CBCL), the Social Skills Rating Scale (SSRS), the California Preschool Social Competency Scale (PSCS), and the Adaptive Social Behavior Inventory (ASBI). A few studies also used measures of peer play.

*Relations between the Early Childhood Environment Rating Scale (ECERS) and Social Development.* Nine studies explored relations between the ECERS and social development. Two-thirds of the studies (six) showed no relations between the ECERS and the Problem Behavior Questionnaire or the Sociability scale of the Classroom Behavior Inventory (CBI) (Kontos, 1991; Dunn, 1993; Kontos & Fiene, 1987), the Social Skills Rating Scale (Frank Porter Graham University of North Carolina Smart Start Evaluation Team, 2003), a composite including the ECERS and the Problem Behaviors scale of the CBI (Peisner-Feinberg et al., 2001), or the social development part of the FACES battery (Zill et al., 2003). On the other hand, two studies found significant relations between the ECERS and the CBI-Sociability (Phillips, McCartney & Scarr, 1987; Phillips, Scarr & McCartney, 1987). Specifically, the ECERS score accounted for 32.9% of the variance in considerateness, 39% of the variance in sociability, and 8.1% of the variance in anxiety as reported by caregivers; maternal ratings of considerateness and sociability also were significant but much smaller in magnitude. A composite including the ECERS had modest

correlations with the CBI (Peisner-Feinberg & Burchinal, 1997). Compared to the findings for cognitive and language development, the ECERS did not demonstrate as consistently strong relations with measures of social development.

*Relations between the Observational Record of the Caregiving Environment (ORCE) and Social Development.* Eight studies examined the relations between the ORCE measure of quality and social development. In two studies, quality related to decreased problem behaviors and increased social competence (Burchinal & Cryer, 2003; NICHD Early Child Care Research Network, 2000b). Burchinal and Cryer (2003) reported that a 1 standard deviation increase on the ORCE related to .87 points on the Adaptive Social Behavior Inventory (ASBI) and a decrease of 1.94 points on the Child Behavior Checklist (CBCL). The NICHD Early Child Care Research Network (2000b) found particularly strong effects for minority and single parents in terms of better social development in children participating in high quality sites. Studies using the Preschool Social Competency Scale (PSCS) to assess children at 4.5 years reported positive relations between ORCE quality and social competence (NICHD Early Child Care Research Network, 2003b; NICHD Early Child Care Research Network, 2002b).

However, a number of findings indicated that increased time in child care centers related to increased externalizing problems as reported by caregivers on the CBCL regardless of quality of care (NICHD Early Child Care Research Network, 2003a; NICHD Early Child Care Research Network, 2002b; NICHD Early Child Care Research Network, 2004). In fact, the Early Child Care Research Network (2003a) found that the combination of lower quality and more time in centers related to more problems and teacher-child conflict. Also, NICHD Early Child Care Research Network (2001) found no relations between ORCE quality and the ASBI or the CBCL for children living in poverty and near-poverty families, and NICHD Early Child Care Research

Network (2002a) found no significant direct paths to social competence using structural equation modeling. These results suggest a dose-dependent relation between quality and social development, positive relations if in care for moderate amounts of time during infancy and negative if in care for significant amounts of time during infancy.

*Relations between Other Quality Measures and Social Development.* Seven studies used alternative quality measures and related them to social development, and results were mixed. Kontos (1991) and Kontos and Fiene (1987) found negative correlations between the Child Development Program Evaluation –Indicator Checklist and the Preschool Behavior Questionnaire (PBQ), positive correlations between the CDPE-IC and the CBI-Sociability, and negative correlations between the Caregiver Observation Form and Scale (COFAS) and the CBI-Sociability. Regression analyses conducted by Kontos (1991) revealed that the CDPE-IC accounted for 17.4% of the variance in the PBQ and 8.5% of the variance in the CBI after controlling for family background factors. Also demonstrating relations between quality and social development, Phillips, Scarr, and McCartney (1987) found that verbal interactions significantly accounted for 35.5% of the variance in CBI-Considerateness and 22.2% of the variance in CBI-Sociability. Teacher-child closeness related to fewer CBI-Behavior Problems (Peisner-Feinberg & Burchinal, 1997). Studies that assessed social skills using ratings of peer play found no relations regardless of quality measure used (Dunn, 1993; Howes, 1997). Use of the Day Care Environment Inventory or the Educational Attitude Scale resulted in findings of no relations to the CBI or the PBQ (Dunn, 1993; Phillips et al., 1987).

*Summary of Relations between Quality and Social Development.* Relations between quality and social development were not consistent and occasionally revealed some negative associations of

participation in child care regardless of quality. In particular, several studies found that increased time in child care, particularly during infancy and for extreme amounts of time, related to more behavior problems, and studies that examined peer play found no relations between quality and ability to interact positively with peers. Evidence of relations varied by informant with quality not associated with social development as assessed via maternal report in any of the reviewed studies. This suggests that caregivers may be more accurate in assessing children's social behavior perhaps due to their greater access than parents to observe children in varied social situations with peers and with adults.

Overall, it seems more difficult to make the case that child care quality unequivocally relates to the social development of preschoolers at this age than to cognitive and language development. Of the quality measures, the ORCE provided more consistent results than did the ECERS or other measures, which deviated from findings for cognitive and language development. Participating in large group settings for long durations places young children who are just learning how to interact with peers in situations that expose them to the opportunity to practice both positive and negative forms of interacting. Thus, it may be that studies attempting to identify relations between quality and social outcomes pick up both the positive and negative aspects of the group experience, resulting in predominately null findings at this age.

However, intervention studies show positive outcomes over time, such as lower antisocial behavior (Yoshikawa, 1995), although they do not directly compare high and low quality programs. It may be that exposure to quality child care must be of sufficient duration and intensity to influence social development; furthermore, stronger relations between quality and social development may exist for children experiencing family and demographic risk factors for

delinquency. Finally, Yoshikawa (1995) found the strongest results for programs that included both quality education interventions for the children and family supports.

### Summary of Relations between Quality and Child Outcomes

Overall, findings were fairly strong for relations between quality of the child care environment and cognitive and language development (see Figure 3). Relations between quality and social development were more mixed, but intervention programs show very long-term social benefits of experiencing high quality intervention programs. Generally, positive relations were more consistent when quality was assessed using the ECERS or the ORCE as opposed to other types of observational assessments. In selecting a measure for this study, the measure of choice appears to be the ECERS because it has demonstrated more consistent relations across a variety of studies whereas the ORCE has only been used in a series of reports stemming from one study. Thus, the ECERS will serve as the dependent variable in this study based on the preponderance of empirical evidence linking the measure to school readiness outcomes.

### Summary of the Literature Review

It is clear based on the preceding review that the structural characteristics most often linked to child outcomes over a number of studies were pre-service teacher education, continuing education, and center financial practices. Further, teacher:child ratio and group size showed relations to child outcomes at the extremes. The relations between structural characteristics and quality most often were revealed when quality was assessed using the ECERS. Finally, the quality measure most often linked to school readiness was the ECERS as well (see Figure 3 for patterns of relations). What remains unclear are three particular aspects of the aforementioned

relations – dosage effects (amount of time spent in high quality classrooms), overlap (the extent to which different predictors share variance that predicts an outcome), and threshold effects (minimum amount needed of a characteristic to produce the outcomes; e.g., percentage of teacher with an Associate’s degree that might relate to improved cognitive development for children in a center).

Regarding dosage, Zill et al. (2003) found improved child development for children that participated in full day Head Start programs compared to half-day programs. Clearly, previous reviews note the importance of dosage in producing child outcomes. Yet, the amount of participation in child care tends to be an individual family decision based on family values, need, and resources, so it would be difficult to use as a quality standard in policy.

Second, it is not clear how the various structural variables can interact, overlap, or predict in combination to quality and to school readiness. The research does not address how much education with how much professional development with how many children in a room can produce high quality that leads to positive child outcomes as demonstrated in intervention literature. This study seeks to clarify the relations among variables and whether meeting some structural regulations can off-set the need to meet other regulations.

Finally, threshold effects need to be determined to adequately define regulatory standards to ensure developmental outcomes (Love et al., 1996). Most of the studies relied on correlational analyses and demonstrated linear relations between variables. One study attempted to determine cut-offs for quality relating to child outcomes, but it was unsuccessful (NICHD Early Child Care Research Network, 1999). Again, this study seeks to extend the literature and our conceptual understanding of the structural characteristics that promote quality by specifying threshold amounts that would be expected to promote optimal child development.

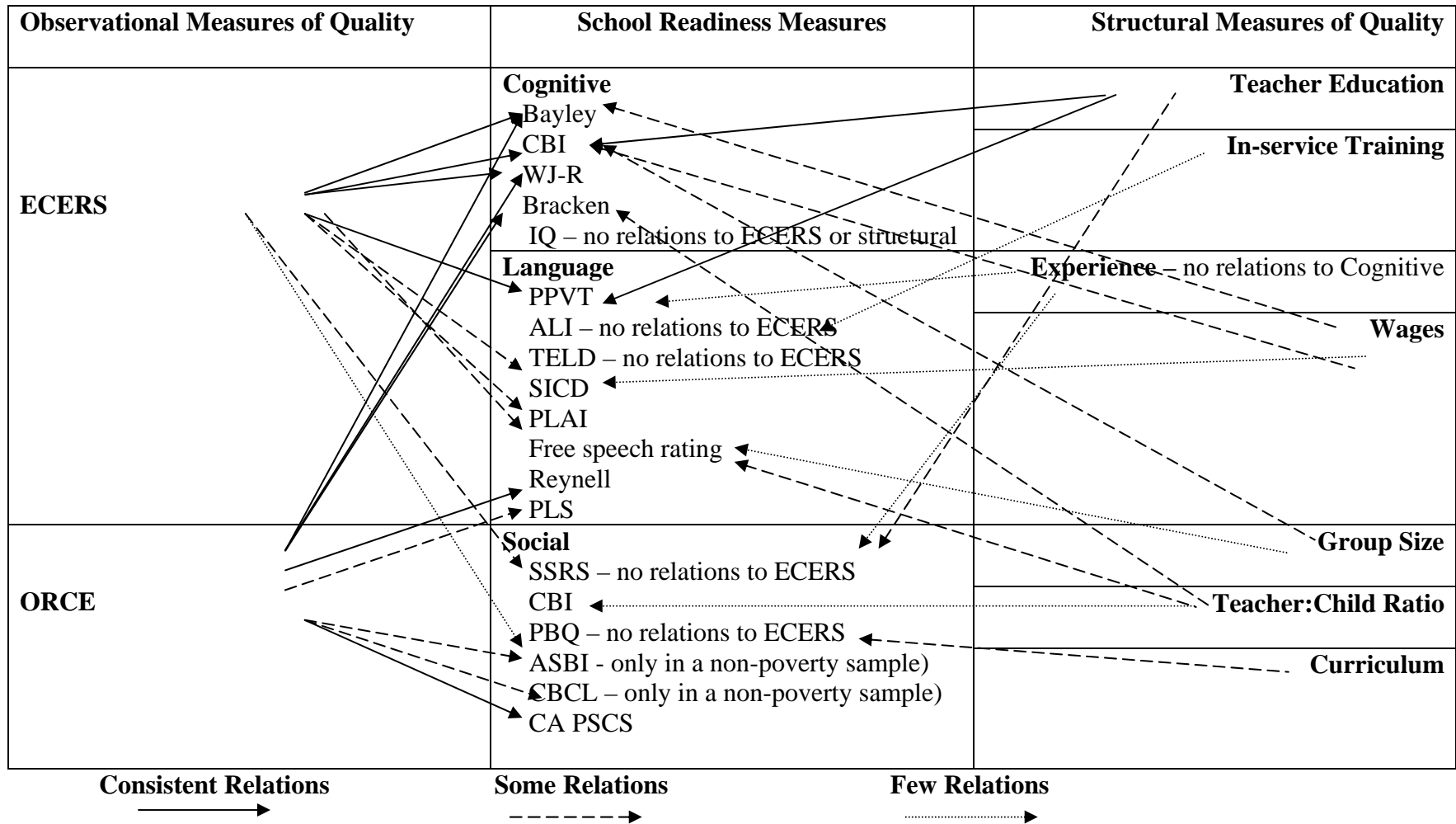


Figure 3: Relations between Observational Measures of Quality, School Readiness Measures, and Structural Measures of Quality

### Purpose of This Research

Thus, the purpose of this research is to address which structural or regulable factors relate to classroom quality, how they relate to one another, and whether thresholds exist before benefits are seen. Specifically,

1. What structural variables most strongly relate to classroom quality?
2. What are the intercorrelations among predictors?
  - a. What is the smallest set of structural variables that best predict quality?
  - b. Are there underlying factors across the structural variables that best predict quality?
  - c. Are there certain structural variables that exert such strong influence that other structural variables are less relevant in the prediction of quality?
3. Among the most predictive structural variables, is there a minimum threshold needed that reliably predicts high quality?

The study is limited to an examination of centers and preschools serving 3- to 5-year-olds.



## METHODOLOGY

### PARTICIPANTS

#### Population

Statisticians at the Pennsylvania State University obtained lists of all the registered providers in the Commonwealth of Pennsylvania from the registration databases of the Department of Education, the Department of Public Welfare (DPW), the Pennsylvania Head Start Association, and the Keystone University Research Corporation. These lists provided names of providers in five categories based on Department of Education, DPW, and Head Start registration guidelines, namely child care centers, preschools/nursery schools (preschools), Head Start centers, group child care homes, and family child care homes. To fill the remaining category of providers recognized by DPW (legally unregulated home providers), Pennsylvania State University statisticians obtained lists of individuals who had contacted “The Better Kid Care Project” to obtain information about becoming home care providers. Since legally unregulated providers are not required to be registered with the Commonwealth, researchers determined that this was the best way to identify them. The final population consisted of 15,220 early care and education sites, including 3,938 child care centers and 625 preschools, representing a nearly exhaustive list of licensed and registered facilities within the classifications.

## Sample

Sample selection consisted of a three-stage process. In the first stage, a larger sample of 637 providers was selected for a telephone survey (Provider Survey). In the second stage, a subset of sites that had responded to the Provider Survey was contacted and recruited to participate in an observational study (Quality Study). The goal was to obtain 400 sites for the Quality Study that would match sites interviewed for the Provider Survey. Because a number of the sites that participated in the Provider Survey declined to participate in the Quality Study, a third stage was added in which additional sites were added to the Quality Study, and those sites were then administered the Provider Survey. The following section explains how sites were selected for participation in these three stages.

*Provider Survey.* The unit of analysis was designated as the provider site, and the goal was to obtain interviews from 600 representative early care and education provider sites of all types. Statisticians at the Pennsylvania State University randomly selected sites to interview based on the distribution of types of providers in the Commonwealth and stratified by the population density of the county in which the provider was located. To ensure adequate representation of providers from all types of regions (e.g., rural counties, counties dominated by small cities, and counties dominated by large cities), the statisticians developed an elaborate sample replacement strategy in which an initial sample of 600 was chosen with three to five replacement sites identified for each site to be interviewed if the initial site refused. Data collection began in May 2002 and extended through October 2002, including the third stage of additional data collection required to obtain a suitable sample size for the combined study. Refusal rates generally were low, ranging from 2% to 13.5% with an average rate of 6.8% (see Table 1). The Provider

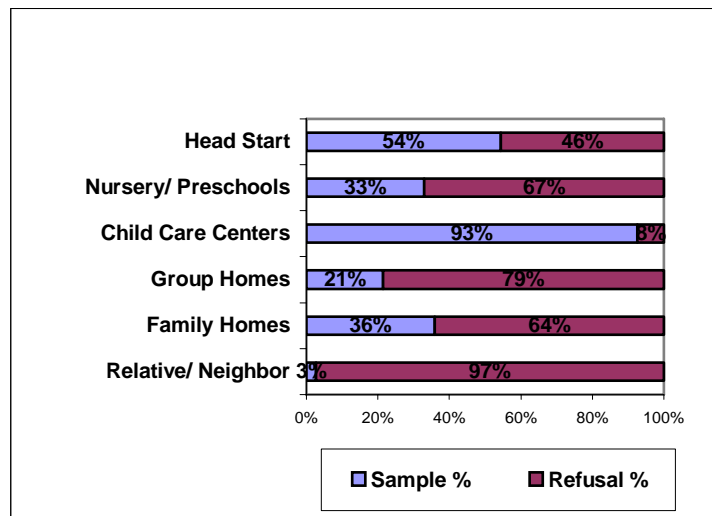
Survey achieved a final sample of 637 sites, including 163 child care centers and 56 preschools. The refusal rates for centers and preschools were 4.7% and 13.5% respectively. The overall response rates for eligible child care centers and preschools that were contacted for the Provider Survey were 80% and 67% respectively. Table 4 gives the details of contact and response rates. No additional information on sites was available with which to assess selective sampling at this stage.

**Table 4: Child Care Provider Telephone Survey: Summary of Contact Outcomes and Response Rates**

Outcome	Total Sample (N = 4,243)	Child Care Centers (N = 900)	Head Start (N = 402)	Pre-Schools (N = 200)	Group Homes (N = 205)	Family Homes (N = 944)	Legally Unregulated (N = 1592)
Completed Interviews	637 (15.0%)	163 (18.1%)	50 (12.4%)	56 (28.0%)	66 (32.2%)	249 (26.4%)	53 (3.3%)
Refusals	289 (6.8%)	42 (4.7%)	8 (2.0%)	27 (13.5%)	26 (12.7%)	102 (10.8%)	84 (5.3%)
Never Able to Contact	1,135 (26.7%)	467 (51.9%)	105 (26.1%)	98 (49.0%)	40 (19.5%)	176 (18.6%)	249 (15.6%)
Ineligible/Bad Contact Info.	1,519 (35.8%)	119 (13.2%)	48 (11.9%)	15 (7.5%)	47 (22.9%)	247 (26.2%)	1,021 (64.1%)
No Phone # (Not Called)	663 (15.7%)	109 (12.1%)	191 (47.5%)	4 (2.0%)	21 (10.2%)	165 (17.5%)	173 (10.9%)

*Quality Study.* All sites that participated in the Provider Survey were eligible for the Quality Study, and sites for the Quality Study were drawn from these participants. However, an additional 121 sites were contacted because of the high refusal rate (60.6%)

of the original 637 providers once they were contacted for the Quality Study. The overall refusal rate for the total of 758 sites contacted to participate in the Quality Study was 69% and ranged from 8% to 97% (see Figure 4). Thus, the final sample for the Quality Study consisted of 372 providers and included 111 centers and 48 preschools. The refusal rates for centers and preschools were 8% and 67% respectively. The overall response rates for eligible child care centers and preschools that were contacted for the Quality Study were 93% and 33% respectively.



**Figure 4: Sample and Refusal Percentages by Type of Facility**

The sample to be included in this study required data from both the Provider Survey and the Quality Study. Of the final 372 sites in the Quality Study, 58 (15.6%) refused to participate in the Provider Survey, leaving a final sample of 314 sites for which there were data from both the Provider Survey and the Quality Study. This sample

included 100 child care centers (refusal rate = 9.9%) and 38 preschools (refusal rate = 20.8%) to be analyzed for this study.

### Assessment of Selective Sampling

This study focuses principally on centers, with an assessment of the generality of findings to preschools. There were 900 centers for which contact was attempted to participate in the Provider Survey. Refusals were very low with only 4.7% declining to participate, which was very good. Yet, only 18.1% (163) centers actually completed the Provider Survey because many sites were never able to be contacted (467), were ineligible or had incorrect contact information (119), or had no phone number (109). Participation in the Quality Study was not as good. Including the sites contacted first for the Quality Study, the refusal rate for centers was 8%, almost double the refusal rate for the Provider Survey. The refusal rate for preschools was 67%.

It was possible to evaluate selective participation in the Quality Study by comparing values for structural characteristics of those sites that participated in the Quality Study with those that only completed the Provider Survey. One Way ANOVA tests were used for numerical structural characteristics, and Chi Square tests were used for categorical structural characteristics. Table 5 presents the mean values for numerical structural characteristics. Only parent involvement activities and training budget per staff were significantly different across the two groups, and for both, participants in the Provider Survey only reported significantly higher values than those participating in the Quality Study. Table 6 presents the categorical structural predictors values. Use of

developmental assessments was significantly different across the samples with more participants in the Provider Survey reporting that they used developmental assessments.

**Table 5: Mean Values for Structural Predictor Variables for Child Care Centers that Refused to Participate in the Quality Study (Provider Survey) and for Those That Completed the Quality Study**

<b>Structural Predictor</b>	<b>Provider Survey or Quality Study</b>	<b>N</b>	<b>Mean</b>	<b>Sig.</b>
# hours directors spend in workshops or training	Provider Survey	70	51.69	.247
	Quality Study	99	23.72	
# hours primary classroom staff spend in workshops or training	Provider Survey	68	13.78	.450
	Quality Study	95	12.13	
# of benefits provided	Provider Survey	68	3.81	.635
	Quality Study	99	3.68	
# parent involvement activities	Provider Survey	70	4.16	.000
	Quality Study	100	3.13	
# ways provider interacts with schools	Provider Survey	67	2.78	.587
	Quality Study	99	2.99	
Count of skills taught	Provider Survey	67	12.58	.398
	Quality Study	98	12.49	
Percent directors with 5+ years	Provider Survey	70	60.85%	.143
	Quality Study	99	50.66%	
Percent directors with BA or more	Provider Survey	68	79.33%	.102
	Quality Study	100	70.6%	
Preschool group size	Provider Survey	69	14.33	.353
	Quality Study	100	25.41	
Preschool ratio	Provider Survey	69	8.26	.596
	Quality Study	99	14.67	
Annual salary of directors in 1 <sup>st</sup> yr	Provider Survey	61	\$23,919.63	.438
	Quality Study	87	\$23,014.53	
Annual salary of primary classroom staff in 1 <sup>st</sup> year	Provider Survey	64	\$17,124.95	.668
	Quality Study	92	\$16,852.92	
Percent staff with 5+ years	Provider Survey	69	30.8%	.149
	Quality Study	99	24.29%	
Percent staff with AA or more	Provider Survey	63	42.58%	.254
	Quality Study	99	36.77%	
Training Budget Per Staff	Provider Survey	60	\$223.89	.005
	Quality Study	86	\$75.53	

**Table 6: Frequencies of “Yes” Responses for Categorical Structural Predictors for Child Care Centers that Refused to Participate in the Quality Study and for Those That Completed the Quality Study**

<b>Structural Predictor Variables</b>	<b>Provider Survey Refusals</b>	<b>Sample for Current Study</b>	<b>Significance</b>
Accredited	17.1%	14.1%	.667
Use developmental assessments	86.6%	72.7%	.036

## INSTRUMENTS

### Telephone Provider Survey

In consultation with early childhood experts, I, along with colleagues, developed two surveys to administer via the telephone – one for center-based providers (e.g., child care centers, Head Start sites, and preschools) and one for home-based providers (see Appendix A for a copy of the center survey). Since this study only focuses on child care centers and preschools, only the center-based providers survey is included in analyses. The surveys covered funding, charges, ages served, staffing levels, staff education and demographics, wages, benefits, training areas and needs, turnover, child and family demographics, and many aspects of program content and practices. The surveys were to be completed by the directors of the center-based sites. The surveys were reviewed and approved by four early care and education provider experts; four members of an early childhood care and education Task Force; staff within the State Departments of Education, Health, and Public Welfare; and the state legal department to ensure the usefulness and appropriateness of the information to be collected.

The purpose of the Provider Survey was to gather demographic information about child care providers and to assess the nature of the services that they provided. The Survey was based on a similar study completed in 1989 and drew a number of questions from this source. Specific questions were selected based on their ability to describe the nature of care being provided to young children in Pennsylvania and to explore potential policy issues. The final Survey contained 63 questions and was designed to provide answers to the following questions:

- Do the types of early care and education providers differ geographically?
- What is the quality and the fees charged for these services, according to providers?
- What are characteristics of these programs (e.g., accreditation status, location, administrative oversight, etc.)?
- What are the characteristics (e.g., racial background, educational level, experience) of staff, and do the characteristics differ by the type of program?
- What are the training needs of these programs?
- What are some of the challenges that these programs face in meeting operating expenses, hiring staff, and retaining staff?
- What types of children and families are served, and are the programs adequately supported to be able to serve all children, including children with special needs?
- What services are provided to participants by different types of programs?



### Structural Predictor Variable Selection

A combination of empirical findings and theoretical relations identified in the literature review have been used to select the structural predictors. Table 7 presents the 25 potential independent variables from the Provider Survey, an indication of whether that variable is included in the final set, and an explanation of why the variable has been included. Empirical justification consists of use of inter-correlations and literature review findings. From the original 25 potential independent variables, 17 variables were selected for use in analyses. The 17 variables will be included in data reduction analysis techniques (i.e., factor analysis and use of standardized scores) to identify relevant “sets” of variables for inclusion in formal regression analyses and lead to the selection of 8 “pure” variables for regression analyses chosen based on theoretical relevance in the prediction of ECERS and independence from measures contained in the dependent variable. Table 8 presents the correlation matrix for the reduced set of 17 structural predictors initially considered for inclusion in analyses.

**Table 7: Structural Predictor Variables – All Available for Analysis and Decision-Making Process for Final Set**

<b>Provider Survey Variables</b>	<b>Explanation for Inclusion in Regression Analyses</b>	<b>Survey Question</b>
Percent primary staff with AA or more	Teacher education consistently related to classroom quality and child outcomes in literature and significantly correlated with six other selected structural predictors.	21b. You mentioned that you have a total of [insert number] Primary Classroom Staff, what is the (are their) highest education level(s) attained? ( <b>Responses</b> - less than 8 <sup>th</sup> = 1, >8 <sup>th</sup> but no degree = 2, diploma or GED = 3, Certificate or AA = 4, BA = 5, MA or more = 6)
Percent directors with BA or more	Director (i.e., teacher) education consistently related to classroom quality in literature and significantly correlated with six other selected structural predictors.	21a. What is the highest level of education attained by the Director/Program Coordinator(s)? ( <b>Responses</b> - less than 8 <sup>th</sup> = 1, >8 <sup>th</sup> but no degree = 2, diploma or GED = 3, Certificate or AA = 4, BA = 5, MA or more = 6)
Number of benefits provided	Conceptually related to wages; empirical relations with quality demonstrated; and significantly correlated with two other selected structural predictors.	23. Do full-time staff receive any of the following benefits - paid vacation, health insurance for self, health insurance for family members, retirement benefits, child care, paid sick leave/personal days? (Calculated by adding number of “yes” responses so value = 0 – 6)
Annual training budget per staff member	Conceptually related to continuing education/training and center financial practices and significantly correlated with four other selected structural predictors.	31. On average, what is your best estimate of how much you organization spends on training and professional development on an annual basis? (Calculated by dividing value by total number of staff including aides)
Annual salary of 1 <sup>st</sup> year primary staff	Moderate and consistent relations in literature; significant correlations with six other selected structural variables.	23b. For Primary Classroom Staff, what is the average salary in the first year? Is that number hourly, monthly, or annual? (Calculated to reflect annual amount for all cases.)
Annual salary of 1 <sup>st</sup> year directors	Via similarities to staff salary, moderate and consistent relations in literature; significant correlations with seven other selected structural variables.	23a. For Director/Program Coordinator(s), what is the average salary in the first year? Is that number hourly, monthly, or annual? (Calculated to reflect annual amount for all cases.)

Table 7 (continued)

<b>Provider Survey Variables</b>	<b>Explanation for Inclusion in Regression Analyses</b>	<b>Survey Question</b>
Percent primary staff with 5 or more years experience	Some conceptual relevance; unclear relations in literature to be examined in this study; significant correlations with two other selected structural variables.	20.3b. How many Primary Classroom Staff have been employed for more than 5 years? (Calculated by dividing this value by number of primary classroom staff)
Percent directors with 5 or more years experience	Via similarity to staff experience, some conceptual relevance; some relations in literature (although not always positively correlated); significant correlations with one other selected structural variable.	20.3a. How many Director/Assistant Director/Program Coordinator(s) have been employed for more than 5 years? (Calculated by dividing this value by number of directors)
<b>Included in Factor Analyses and Standardized Score Regressions</b>		
Preschool classroom teacher:child ratio	Conceptually strong relevance; fairly consistent relations in literature; significant correlations with six other selected structural variables.	41c. Assuming every child were full time, we'd like to know ... For 3 – 5 year olds, what's the number enrolled? Your capacity? The average daily attendance? The number of staff? The number of rooms? (Calculated by dividing number of children by number of staff assigned to the age group)
Preschool classroom group size	Conceptually strong relevance; fairly consistent relations in literature; significant correlations with one other selected structural variables.	41c. Assuming every child were full time, we'd like to know ... For 3 – 5 year olds, what's the number enrolled? Your capacity? The average daily attendance? The number of staff? The number of rooms? (Calculated by dividing number of children by number of rooms for that age group)
Annual average hours of training for primary staff	Conceptual relevance; moderate and fairly consistent relations in literature; significant correlations with four other selected structural variables. Not included in formal regressions due to overlap with item 43 in the ECERS.	26b. Please indicate the average hours per year that a typical staff person at your center spends in in-service workshops or receiving training to enhance their professional skills? Primary Classroom Staff?

Table 7 (continued)

<b>Provider Survey Variables</b>	<b>Explanation for Inclusion in Regression Analyses</b>	<b>Survey Question</b>
Annual average hours of training for directors	Via similarities to staff training hours, conceptual relevance; moderate and fairly consistent relations in literature; significant correlations with ECERS and with four other selected structural variables. Not included in formal regressions due to overlap with item 43 in the ECERS.	26a. Please indicate the average hours per year that a typical staff person at your center spends in in-service workshops or receiving training to enhance their professional skills? Director/Assistant Director/Program Coordinator?
Accreditation status	Conceptual relevance; significant correlations with two other selected structural variables.	6. Is your site accredited by any professional organization, or are you working toward accreditation? ( <b>Responses</b> – yes, working toward accreditation, no; coded only for yes =1, else = 0)
Count of 13 skills taught to children	Conceptual relevance; significant correlations with six other selected structural variables. Not included in formal regressions due to potential overlap with “Activities” and “Interactions” sections of the ECERS.	44. Some programs teach specific skills and others do not. Do you attempt to teach children any of the following skills or behaviors - how to separate from parents; the names of many colors and shapes; hop, skip, and move to music; play cooperatively with other children; recognize many letters of the alphabet; prewriting (coloring figures with lines, draw shapes, tracing); count to ten; cooperate with teacher; follow directions; work independently; read many words; recognize feelings; appreciate their culture and other cultures? (Calculated by adding number of “yes” responses so 0 – 13)
Use developmental assessments	Conceptual relevance; significant correlations with six other selected structural variables.	45. Do you use developmental or achievement assessments to guide what you teach the children or to measure progress? (Yes = 1, no = 0)

Table 7 (continued)

<b>Provider Survey Variables</b>	<b>Explanation for Inclusion in Regression Analyses</b>	<b>Survey Question</b>
Count of 6 parent involvement activities	Best practices convention; significant correlations with five other selected structural variables. Not included in formal regressions due to overlap with item 38 in the ECERS.	47. Some centers involve children in their programs and others do not. The next group of questions focuses on things you might do to involve parents in your program. A. Do you regularly ask parents to donate snacks or materials for special events? B. Do you regularly ask parents to volunteer (e.g., help at parties or drive for field trips)? C. Do you regularly ask parents to attend parent meetings? D. Do you regularly discuss children's progress with parents? E. Do you regularly provide suggested activities for parents to complete at home that expand on what is being taught during the day? F. Do you regularly provide or connect parents with parent education workshops or activities? (Calculated by adding number of "yes" responses so 0 – 6)
Count of 8 transition to school activities	Best practices convention; significant correlations with two other selected structural variables.	46. Do you regularly interact or communicate with the public schools in your area regarding the children at your site? A. Talk with public school teachers to teach the social and academic skills needed to prepare children for school. B. Routinely pass on records of our children. C. Inform the school of children coming to them with special needs. D. Participate in joint training. E. Coordinate kindergarten registration. F. Hold conferences with school. G. Take preschool children to visit their public schools. H. Help inform parents about kindergarten readiness and expectations. (Calculated by adding number of "yes" responses so 0 – 8)

Table 7 (continued)

Provider Survey Variables	Explanation for No Inclusion in Regression Analyses	Survey Question
<b>Not Selected for Further Analysis</b>		
Percent primary staff with BA or more	Significant conceptual overlap with percent primary staff with AA or more; AA or more is more common for the population so will serve as the “teacher education” variable	21b. You mentioned that you have a total of [insert number] Primary Classroom Staff, what is the (are their) highest education level(s) attained? ( <b>Responses</b> - less than 8 <sup>th</sup> = 1, >8 <sup>th</sup> but no degree = 2, diploma or GED = 3, Certificate or AA = 4, BA = 5, MA or more = 6)
Internet access	No conceptual relevance; no literature support; difficult to interpret relevance because did not clarify if staff knew how to use the Internet access as a teaching resource	32. Does your facility have a computer with access to the Internet? (Coded as yes = 1, no = 0)
Number hours directors spend monitoring staff	Correlations with other variables indicated that directors spent more time supervising less educated staff so less conceptually meaningful in prediction of quality	42. On average, how many hours per week do Directors spend in rooms with the children present monitoring direct care staff and providing feedback to staff based on this monitoring?
Hourly rate parents pay for preschool children	In practice, related more to what the market will bear rather than being a true indication of quality.	12c. What is the full charge (that is, the maximum paid by a parent for one child) for each age group of children you serve? Please specify whether the charge is hourly, part day, full day, weekly, or monthly. For children ages 3 – 5, what is the charge? (Calculated to hourly rate for all cases.)
Center pays for all of training expenses	Conceptually captured in provision of benefits and no relevant correlations with other selected variables.	27. Does your organization pay for training expenses, such as registration fees, for staff to attend training for at least 6 hours? (Coded as pay all fees = 1, else = 0)

Table 7 (continued)

<b>Provider Survey Variables</b>	<b>Explanation for No Inclusion in Regression Analyses</b>	<b>Survey Question</b>
Center pays full wages when in training	Conceptually captured in provision of benefits and no relevant correlations with other selected variables.	28. Does your organization pay staff for at least 6 hours of staff's time to attend training? (Coded as pay full wages = 1, else = 0)
Director plans to continue in the profession	Low variability in responses makes useless.	38. Do you see yourself continuing in this line of work in the long term, or is this temporary? (Long-term = 1, temporary = 0)
Center uses a curriculum or written materials	Low variability in responses makes useless.	43. Do you regularly use a written manual, program guide, curriculum, parts of a curriculum, or written lesson plans? (Yes = 1; no = 0)

**Table 8: Correlation Matrix for Structural Variables Included in Any Analyses**

	ECERS	% teachers with AA+	% directors with BA+	# benefits	Training budget per staff	Teacher salary	Director salary	Director hours in training	Teacher hours in training	% teachers with 5+ yrs	% directors with 5+ yrs	Group Size	Ratio	Accred	Skills taught	Dev Assess	Parent involve	Transition
ECERS	1	.397**	.220*	.354**	.225*	.264**	.185	.268**	.191	.210*	.099	.122	.063	.189	.161	.146	.076	.097
% teachers with AA+	.397**	1	.262**	.232*	.248*	.388**	.164	.167	.300**	.160	.121	.111	-.062	.325**	.226*	.326**	.241*	-.050
% directors with BA+	.220*	.262**	1	.104	.274**	.072	.108	.038	.002	.033	.051	.046	-.049	-.073	.035	.010	-.105	.063
# benefits	.354**	.232*	.104	1	.052	.342**	.385**	.191	.150	.130	-.059	.181	-.233*	.154	.340**	.291**	.143	.041
Training budget per staff	.225*	.248*	.274**	.052	1	.164	.027	.090	.340**	.067	.028	-.070	-.021	-.025	.088	.109	.093	.020
Teacher salary	.264**	.388**	.072	.342**	.164	1	.552**	.132	.014	.160	-.083	-.029	-.249*	.152	.326**	.242*	.117	.242*
Director salary	.185	.164	.108	.385**	.027	.552**	1	.247*	-.053	.165	-.096	.041	-.292**	-.062	.192	.200*	.220*	.250*
Director hours in training	.268**	.167	.038	.191	.090	.132	.247*	1	.421**	.031	.148	.036	-.060	.133	.231*	.170	.215*	.124
Teacher hours in training	.191	.300**	.002	.150	.340**	.014	-.053	.421**	1	-.043	.109	-.018	-.097	.283**	.141	.139	.156	.108
% teachers with 5+ yrs	.210*	.160	.033	.130	.067	.160	.165	.031	-.043	1	.386**	-.016	-.214*	.000	-.011	.127	-.027	.089
% directors with 5+ yrs	.099	.121	.051	-.059	.028	-.083	-.096	.148	.109	.386**	1	.146	.194	.026	.035	.101	.017	.032
Group size	.122	.111	.046	.181	-.070	-.029	.041	.036	-.018	-.016	.146	1	.319**	.063	.037	.147	.003	-.027
Ratio	.063	-.062	-.049	-.233*	-.021	-.249*	-.292**	-.060	-.097	-.214*	.194	.319**	1	-.074	-.100	-.117	-.014	-.068
Accred	.189	.325**	-.073	.154	-.025	.152	-.062	.133	.283**	.000	.026	.063	-.074	1	.142	.053	-.082	-.098
Skills taught	.161	.226*	.035	.340**	.088	.326**	.192	.231*	.141	-.011	.035	.037	-.100	.142	1	.298**	.425**	.107
Dev Assess	.146	.326**	.010	.291**	.109	.242*	.200*	.170	.139	.127	.101	.147	-.117	.053	.298**	1	.413**	.024
Parent involve	.076	.241*	-.105	.143	.093	.117	.220*	.215*	.156	-.027	.017	.003	-.014	-.082	.425**	.413**	1	.135
Transition	.097	-.050	.063	.041	.020	.242*	.250*	.124	.108	.089	.032	-.027	-.068	-.098	.107	.024	.135	1

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).



### The Early Childhood Environment Rating Scale (ECERS-R)

The Early Childhood Environment Rating Scale, Revised (ECERS-R) is a measure of program quality and consists of 43 items organized into 7 sub-scales: (1) Space and Furnishings, (2) Personal Care Routines, (3) Language Reasoning, (4) Activities, (5) Interactions, (6) Program Structure, and (7) Parents and Staff. The descriptors cover the needs of children ages 2 ½ to 5 years of age. This instrument has been widely used in the early childhood field for many years to determine the quality of child care. The ECERS-R is a revision of the original ECERS; it is not a new scale. The ECERS-R retains the original scale's broad definition of environment, including those spatial, programmatic, and interpersonal features that directly affect the children and adults in an early childhood environment.

The ECERS-R consists of 43 items each scored 1-7 with: 1 = inadequate, 3 = minimal, 5 = good, and 7 = excellent. These odd-numbered score levels are well-defined in the manual. Scores of even numbers (i.e., 2, 4, or 6) are given if a center meets all of the criteria for the lower odd score and over half of the criteria for the next higher odd score (e.g., all criteria for a 3 and over half the criteria for a 5 would be scored as a 4). The instrument is designed to produce a normal distribution of scores. The percentage of agreement across the scale is 86.1%, with no item having an indicator agreement level below 70%. Correlations between two observers were .921 product moment correlation (Pearson) and .865 rank order (Spearman) with an interclass correlation of .915 (Harms, Clifford & Cryer, 1998).

The ECERS-R was designed such that the individual requirements of each scale are less valuable than the average total score. In fact, the scales are weighted, through repetition, on key items to ensure that the total score reflects those aspects of the child care environment and interactions that most support positive development.

## DATA COLLECTION AND PROCEDURES

### Provider Survey

The Provider Survey was conducted in three parts – an initial mailing to all potential participants to introduce them to the study, a telephone call to schedule an interview, and finally the completion of the telephone survey. The Telephone Survey instrument is described in the “Instruments” section below. Worksheets were developed for center-based providers to gather information prior to completing the telephone interview, which included information such as annual operating budget and number of subsidized children. These worksheets were mailed with an introductory letter explaining the study and encouraging participation. The University Center for Social and Urban Research (UCSUR) trained staff and conducted the telephone interview. The interviews lasted approximately 30 minutes. Sites that completed interviews were sent a check for \$25 as a token of appreciation. Data were collected from May through October 2002.

### Quality Study

Researchers at the Capital Area Early Childhood Training Institute (CAECTI [www.caecti.org](http://www.caecti.org)) conducted the Quality Study. CAECTI, a division of the Prevention

Research Center at the Pennsylvania State University, is a training and research institute aimed at improving the quality of services to infants, toddlers, and preschoolers through mentoring programs for infant and toddler caregivers and parents and early childhood certificate programs. Twenty-one data collectors who had extensive experience and expertise in the early childhood field were trained to conduct the Quality Study using the Early Childhood Environment Rating Scale – Revised (ECERS-R). The ECERS-R is described in the “Instruments” section below.

As part of the training process, Debby Cryer, one of the authors of these scales, provided training and reliability testing on the tools with four senior data collectors who then served as group leaders for the four weeks of extensive training for the remaining data collectors. Later, five more data collectors were hired and trained for two weeks. The training included both classroom instruction and site observations at numerous child care centers and family day care homes across Pennsylvania. Data were collected during a 12-week period (July 1 through September 30 of 2002). Inter-rater reliability was established at .85 or above and was monitored throughout the Quality Study to ensure continued reliability and to assess observer drift using duplicate data. Specifically, 15 sites were randomly selected after eight to ten weeks of data collection. Inter-rater reliability was confirmed such that all duplicate data met the .85 or above criteria.

Preschool classrooms for observation in the Quality Study were selected by random. Data collectors spent 3 – 4 hours on visits to the centers to complete the ECERS-R and the Caregiver Involvement Scale (CIS).

### Additional Information Gathered by Observers

The on-site observers also coded information about the number of staff present and whether a curriculum was in use in the classroom and asked the teacher's highest level of formal education and her field of study. The staff, curriculum, and education questions duplicated questions asked in the Provider Survey for verification at the classroom level.

## RESULTS

Four sets of analyses were conducted. Their purpose was to determine: (a) univariate and multivariate relations between structural variables and quality as measured by the ECERS in a sample of child care centers to determine a minimum set of structural predictors of quality; (b) the usefulness of the structural predictor variables in discriminating between categories of quality (e.g., poor, adequate, high); (c) threshold amounts of predictor variables needed to predict higher quality settings; and (d) whether the minimum structural variable solution for centers could be applied to accurately describe quality in a sample of preschools.

First, it was important to maximize the number of cases for use in data analyses. Several structural variables had either missing data or outlier variables that would reduce  $N$  and weaken the ability to detect meaningful associations. Since the correlations among variables rarely were more than .30, using regression techniques to fill in missing data would not be very accurate; so, the mean of the available actual data for all missing or outlier values was imputed. Outliers consisted of values two- to three-standard deviations from the mean. The two-standard deviation criterion was used only for the annual salary of first-year directors because the minimum three data values were clearly not reasonable in a bounded and skewed distribution. Table 9 presents the structural variables for which

the mean was imputed, the number of cases for which this was done, mean levels, and descriptive characteristics for this revised set of dependent and independent variables.

**Table 9: Descriptive Statistics for Structural Variables and the ECERS**

	<i>N</i>	<i>N</i> for Imputed Cases	Minimum	Maximum	Mean	Std. Deviation
<b>Included in Main Regression Analyses</b>						
ECERS Total Score	100	0	1.86	6.29	3.87	.91
Director hours in training	100	1	6	100	23.72	21.24
Teacher hours in training	100	5	6	36	12.13	6.59
% directors with BA+	100	0	.00	1.00	.71	.35
% teachers with AA+	100	3	.00	1.00	.37	.29
Training budget per staff	100	13	.00	357.14	79.59	76.83
# benefits	100	0	.00	6.00	3.68	1.77
Director salary	100	15	12000.00	43326	23345	5885.58
Teacher salary	100	8	8000.00	26100	16853	3407.76
<b>Included in Factor and Standardized Score Analyses</b>						
Group size	100	1	.00	36.50	15.57	7.30
Teacher:child ratio	100	2	.00	16.50	4.63	3.33
Accredited	100	1	.00	1.00	.14	.35
School transition	100	0	0	8	2.99	2.61
Skills taught	100	2	10	13	12.49	.74
Parent involve	100	0	1	4	3.13	.95
Teachers with 5+ yrs	100	0	.00	1.00	.24	.27
Directors with 5+ yrs	100	0	.00	1.00	.51	.45
Assessment	100	0	0	1	.73	.45

## ASSOCIATION BETWEEN STRUCTURAL VARIABLES AND OBSERVED QUALITY (ECERS Total Score)

The first goal of this study was to identify structural predictors of quality as measured by the ECERS Total Score. Initially, simple correlations were calculated between the 17 structural variables in Table 5, selected on the basis of the aforementioned empirical and conceptual considerations, to determine univariate relations to each other and ECERS Total Score. Seven structural variables had significant correlations with the ECERS Total Score in this sample of child care center classrooms (see Table 8). The variable with the highest correlation was the percentage of primary classroom teachers (hereafter referred to as “teachers”) with an Associate’s degree or higher ( $r = .40, p < .01$ ). Other significant correlations (listed in order of strength of their relations with ECERS-R Total Scores) included the number of benefits provided ( $r = .35$ ), the average annual hours the director spends in training ( $r = .27$ ), the average annual salary of first-year teachers ( $r = .26$ ), the annual training budget per staff person ( $r = .23$ ), the percentage of directors with a Bachelor’s degree or more ( $r = .22$ ), and the percentage of teachers with five or more years of experience ( $r = .21$ ). In short, quality was higher when centers had more classroom teachers with Associate’s degrees who were experienced and well-paid; when centers provided more benefits and allocated more funding to support professional development for all staff; and when directors had Bachelor’s degrees or more and spent ample time in continuing education classes.

## VARIABLE REDUCTION ANALYSES – FACTOR ANALYSIS

To identify dimensions that might underlie the structural variables, a principal components factor analysis with varimax rotation was conducted to reduce the 17 structural variables to a few underlying dimensions (i.e., education, financial investment, structure, etc.). These analyses revealed a 7-factor solution that included factors reflecting salary and benefits, program components, staff participation in continuing education, staff pre-service education, staff experience, accreditation, and structure of the classroom (see Table 10). The seven factors accounted for 8.30% to 13.54% of the variance for the rotation sums of squared loadings.

Although most of the loadings made conceptual sense, a few variables loaded most highly on factors for unclear conceptual reasons, whereas the second highest loading made more conceptual sense. In these cases (3), the most conceptual assignment was used. Training budget per staff person was considered with the “Salary and Benefits” factor because of its clear association with center finances. Transition to school activities were considered in the “Programs” factor because it is an activity that centers can do that reflects best practices for supporting quality. Accreditation status was part of the “Continuing Education” factor because it reflects a commitment to professionalism.

Next, the weighted factor scores were used in a multiple regression to predict ECERS Total Score and to determine whether any individual factors were significant predictors. This information would then be used to select the minimum set of individual structural variables (drawn from the original 17 structural characteristics) for subsequent analyses. This model significantly accounted for 27.4% of the variance in ECERS scores (see Table 11). The factors of Salary and Benefits, Pre-Service Education, and



Continuing Education were significant predictors in the model ( $p < .05$ ). Factors related to Accreditation, Staff Experience, and Structure were moderately predictive ( $p < .10$ ).

**Table 10: Factor Analysis Using 17 Structural Variables – 7-Factor Solution**

Variable	Factor						
	Salary and Benefits	Programs	Continuing Education	Pre-Service Education	Staff Experience	Accreditation Status	Structure
<i>% of Variance</i>	<i>13.54%</i>	<i>11.07%</i>	<i>9.47%</i>	<i>8.72%</i>	<i>8.46%</i>	<i>8.44%</i>	<i>8.30%</i>
Director Salary	<b>.792</b>	.133	.045	.016	.028	-.238	-.051
Teacher Salary	<b>.748</b>	.157	.039	.154	.029	.060	-.123
# benefits	<b>.638</b>	.218	.078	.017	-.012	.246	.107
Training budget per staff	<b>-.077</b>	.147	.198	.766	.004	-.007	-.163
Parent involve	.026	<b>.844</b>	.149	-.027	-.052	-.189	-.029
Dev assess	.198	<b>.711</b>	-.028	.072	.184	.139	.050
Skills taught	.299	<b>.600</b>	.189	-.003	-.089	.075	.029
Transition	.341	<b>-.065</b>	.408	-.015	.069	-.584	-.004
Teacher hours in training	-.106	.132	<b>.783</b>	.230	-.012	.255	-.113
Director hours in training	.181	.157	<b>.738</b>	-.020	.072	-.032	.061
Accred	.143	-.101	<b>.332</b>	-.121	-.007	<b>.766</b>	.016
% directors with BA+	.200	-.169	-.076	<b>.763</b>	.018	-.076	.143
% teachers with AA+	.262	.319	.125	<b>.460</b>	.174	.475	.070
% teachers with 5+ yrs	.214	-.015	-.088	.024	<b>.848</b>	.011	-.192
% directors with 5+ yrs	-.200	.062	.195	.033	<b>.791</b>	-.019	.261
Group size	.154	.040	-.024	-.025	.063	.118	<b>.840</b>
Ratio	-.418	.004	.000	.026	-.057	-.119	<b>.705</b>

**BOLD** highlights the relevant variables within a factor.

**Bold** and *Italics* is used for variables in unweighted score regression analyses and placed within a category due to conceptual relevance.

**Table 11: Factor Scores Used in Multiple Regression Prediction of ECERS**

<i>R</i>	<i>R</i> <sup>2</sup>	<i>F</i> Change	<i>df</i> 1	<i>df</i> 2	Sig. <i>F</i> Change
.523	.274	4.955	7	92	.000
Predictors (Factors)	Standardized Coefficients (Beta)	<i>T</i>	Sig.	Partial Correlation	Part Correlation
(Constant)		48.420	.000		
Salary and Benefits	.287	3.225	.002	.319	.287
Pre-Service Education	.267	3.008	.003	.299	.267
Continuing Education	.210	2.366	.020	.240	.210
Accreditation	.157	1.766	.081	.181	.157
Staff Experience	.151	1.697	.093	.174	.151
Structure	.148	1.662	.100	.171	.148
Program Components	.083	.933	.353	.097	.083

To further test the significance of individual factors as predictors and provide greater justification for the later selection of a minimum set of variables drawn from the original 17 structural variables, stepwise multiple regressions were run first with all of the weighted factors and then alternating the entry of the factors for Salary and Benefits, Pre-Service Education, and Continuing Education to determine the relative and unique predictive contribution of each of these factors. The initial stepwise multiple regression using all factor scores confirmed that the aforementioned three factors significantly predicted ECERS Total Score, accounting for almost 20% vs. the total of 27.4% of the variance (see Table 12). Furthermore, regardless of the order of entry of these three factors, each of the three factors continued to significantly add to the prediction of ECERS Total Score after controlling for the other two factors. Salary and Benefits

uniquely accounted for 8.2% of the variance; Pre-Service Education accounted for 7.1% of the variance; and Continuing Education accounted for 4.4% of the variance. Notice, the unique variance associated with these three factors sums to 19.7%, nearly the entire total of 19.8%, which means there is essentially no overlapping variance among these three predictor factors that relates to the ECERS. Finally, the three factors continued to significantly add to the prediction of the ECERS Total Score after controlling for the four other factors, which indicates their sufficiency. All of the variables associated with the factors for Programs, Experience, Accreditation, and Structure and their overlap with the significant predictor weighted scores only accounted for 7.6% of the variance in ECERS Total Score, which demonstrates the necessity of Salary and Benefits, Pre-Service Education, and Continuing Education (see Table 13).

The factor analysis and subsequent multiple and stepwise regression analyses reveal that the underlying factors associated with Salary and Benefits, Pre-Service Education, and Continuing Education significantly predict ECERS Total Score, even after controlling for relations with the other factors and each other. This suggests that the structural variables contained in these factors may be part of a minimum, necessary, and sufficient variable set that will account for a significant amount of the variance associated with ECERS Total Score and therefore, may be useful to use in standards to promote quality in child care centers. The individual variables thus would include director salary, teacher salary, benefits, training budget per staff member, teacher and director annual hours in continuing education, and teacher and director pre-service education.

**Table 12: Stepwise Regression Using Factor Scores**

<b>Model</b>	<b><i>R</i></b>	<b><i>R</i><sup>2</sup></b>	<b><i>R</i><sup>2</sup> Change</b>	<b><i>F</i> Change</b>	<b><i>df</i>1</b>	<b><i>df</i>2</b>	<b>Sig. <i>F</i> Change</b>
1. Salary and Benefits	.287	.082	.082	8.767	1	98	.004
2. Salary and Benefits and Pre-Service Education	.392	.154	.071	8.185	1	97	.005
3. Salary and Benefits, Pre-Service Education, and Continuing Education	.445	.198	.044	5.289	1	96	.024
	<b>Standardized Coefficients (Beta)</b>		<b><i>T</i></b>	<b>Sig.</b>	<b>Partial Correlation</b>	<b>Part Correlation</b>	
Model 1 (Constant)			44.451	.000			
Salary and Benefits	.287		2.961	.004	.287	.287	
Model 2 (Constant)			46.052	.000			
Salary and Benefits	.287		3.068	.003	.297	.287	
Pre-Service Education	.267		2.861	.005	.279	.267	
Model 3 (Constant)			47.059	.000			
Salary and Benefits	.287		3.135	.002	.305	.287	
Pre-Service Education	.267		2.923	.004	.286	.267	
Continuing Education	.210		2.300	.024	.229	.210	

**Table 13: Stepwise Multiple Regression Entering Factors for Programs, Experience, Accreditation, and Structure Before Factors for Salary and Benefits, Pre-Service Education, and Continuing Education**

<b>Model</b>	<b><i>R</i></b>	<b><i>R</i><sup>2</sup></b>	<b><i>R</i><sup>2</sup> Change</b>	<b><i>F</i> Change</b>	<b><i>df</i>1</b>	<b><i>df</i>2</b>	<b>Sig. <i>F</i> Change</b>
1. Structure, Accreditation, Staff Experience, and Programs	.276	.076	.076	1.955	4	95	.108
2. Structure, Accreditation, Staff Experience, Programs, Pre-Service Education, Continuing Education, and Salary and Benefits	.523	.274	.198	8.350	3	92	.000
	<b>Standardized Coefficients (Beta)</b>		<b><i>T</i></b>	<b>Sig.</b>	<b>Partial Correlation</b>	<b>Part Correlation</b>	
Model 1 (Constant)			43.622	.000			
Program Components	.083		.841	.403	.086	.083	
Staff Experience	.151		1.529	.130	.155	.151	
Accreditation	.157		1.591	.115	.161	.157	
Structure	.148		1.498	.138	.152	.148	
Model 2 (Constant)			48.420	.000			
Program Components	.083		.933	.353	.097	.083	
Staff Experience	.151		1.697	.093	.174	.151	
Accreditation	.157		1.766	.081	.181	.157	
Structure	.148		1.662	.100	.171	.148	
Salary and Benefits	.287		3.225	.002	.319	.287	
Continuing Education	.210		2.366	.020	.240	.210	
Pre-Service Education	.267		3.008	.003	.299	.267	

#### VARIABLE REDUCTION ANALYSES – MULTIPLE REGRESSION WITH STANDARDIZED SCORES

Standardized scores were obtained for all 17 variables, and the unweighted variables defining each factor (see bold-faced and italicized loadings in Table 7) were added to provide an unweighted factor score. Unweighted scores would conform to common use, which would not be the case with factor scores, thus providing a clearer sense of any underlying factors that would suggest a minimum set of structural predictors. Also, the coefficients in regression analyses using weighted scores are often unreliable, so using the unweighted often is preferred. In contrast to the weighted score analyses above

(Accreditation was its own factor), six categories were used in these analyses because Accreditation was combined with Continuing Education. The unweighted factors included Salary and Benefits (i.e., director and teacher salary, training budget per staff member, and benefits), Continuing Education (i.e., director and teacher annual hours in training and Accreditation based on the latter's conceptual relevance), Programs (i.e., use of developmental assessments, parent involvement activities, skills taught to children, and transition to school activities due to the latter's conceptual relevance), Pre-Service Education (i.e., director and teacher pre-service education), Staff Experience (i.e., director and teacher experience), and Structure (i.e., group size and ratio). Next, these six unweighted composite scores were used in multiple regression analyses to predict ECERS Total Score (see Table 14). This model significantly accounted for 28.9% of the variance ( $p < .05$ ), slightly higher than the weighted factor scores (Table 11). Salary and Benefits, Pre-service Education, and Continuing Education again were significant individual category predictors. Structure was moderately predictive ( $p = .081$ ).

**Table 14: Unweighted Standardized Score Composite Used in Regression Analyses**

<i>R</i>	<i>R</i> <sup>2</sup>	<i>F</i> Change	<i>df</i> 1	<i>df</i> 2	Sig. <i>F</i> Change	
.538	.289	6.303	6	93	.000	
	Standardized Coefficients (Beta)	<i>T</i>	Sig.	Zero-order Correlation	Partial Correlation	Part Correlation
(Constant)		49.203	.000			
Salary and Benefits	.286	2.737	.007	.387	.273	.239
Pre-Service Education	.225	2.331	.022	.388	.235	.204
Continuing Education	.188	2.039	.044	.300	.207	.178
Structure	.157	1.764	.081	.114	.180	.154
Staff Experience	.116	1.306	.195	.185	.134	.114
Programs	-.025	-.252	.802	.184	-.026	-.022

In the next set of analyses, stepwise regression analyses were used to determine whether particular composites were necessary and sufficient to predict ECERS Total Score. Similar to the procedure used with the unweighted factor predictors, stepwise multiple regressions were conducted first with the six standardized score categories and then alternating the entry of the significant standardized score category predictors with the non-significant predictors to determine the relative contribution of each of these categories, leading toward the identification of a minimum set of structural predictors. As expected given the results using weighted factor scores, unweighted Pre-Service Education, Salary and Benefits, and Continuing Education were significant predictors of ECERS Total Score, accounting for 25.1% of the variance (see Table 15) (the unweighted total was 19.8%).

Further, regardless of order of entry used, each of the three unweighted composites significantly added to the prediction of ECERS after controlling for the other categories. Finally, Pre-Service Education, Salary and Benefits, and Continuing Education significantly added to the prediction of the ECERS after controlling for the three other unweighted categories. Differing from the factor score regression analyses, the three other categories (i.e., Structure, Programs, and Staff Experience) moderately predicted ECERS Total Score when entered first as a block before entering Pre-Service Education, Salary and Benefits, and Continuing Education but were not significant after controlling for the significant predictor unweighted factors (see Table 16). Thus, Pre-Service Education, Salary and Benefits, and Continuing Education uniquely accounted for 21.3% of the variance in ECERS Total Score and their overlap with the other three unweighted categories predicted only 3.8% of the variance in ECERS Total Score.

**Table 15: Stepwise Multiple Regression with Unweighted Standardized Composites**

<b>Model</b>	<b><i>R</i></b>	<b><i>R</i><sup>2</sup></b>	<b><i>R</i><sup>2</sup> Change</b>	<b><i>F</i> Change</b>	<b><i>df</i>1</b>	<b><i>df</i>2</b>	<b>Sig. <i>F</i> Change</b>
1. Pre-Service Education	.388	.151	.151	17.399	1	98	.000
2. Pre-Service Education and Salary and Benefits	.467	.218	.068	8.405	1	97	.005
3. Pre-Service Education, Salary and Benefits, and Continuing Education	.501	.251	.032	4.111	1	96	.045
	<b>Standardized Coefficients (Beta)</b>	<b><i>T</i></b>	<b>Sig.</b>	<b>Zero-order Correlation</b>	<b>Partial Correlation</b>	<b>Part Correlation</b>	
Model 1 (Constant)		46.213	.000				
Pre-Service Education	.388	4.171	.000	.388	.388	.388	
Model 2 (Constant)		47.928	.000				
Pre-Service Education	.282	2.913	.004	.388	.284	.261	
Salary and Benefits	.281	2.899	.005	.387	.282	.260	
Model 3 (Constant)		48.690	.000				
Pre-Service Education	.253	2.627	.010	.388	.259	.232	
Salary and Benefits	.249	2.572	.012	.387	.254	.227	
Continuing Education	.186	2.028	.045	.300	.203	.179	



**Table 16: Stepwise Multiple Regression Entering Salary and Benefits and Pre-Service Education Standardized Composites After Continuing Education, Structure, Program Components, and Experience Standardized Composites**

<b>Model</b>	<b>R</b>	<b>R<sup>2</sup></b>	<b>R<sup>2</sup> Change</b>	<b>F Change</b>	<b>df1</b>	<b>df2</b>	<b>Sig. F Change</b>
1. Structure, Programs, and Staff Experience	.275	.076	.076	2.620	3	96	.055
2. Structure, Programs, Staff Experience, Pre-Service Education, Continuing Education, and Salary and Benefits	.538	.289	.213	9.305	3	93	.000
	<b>Standardized Coefficients (B)</b>	<b>T</b>	<b>Sig.</b>	<b>Zero-order Correlation</b>	<b>Partial Correlation</b>	<b>Part Correlation</b>	
Model 1 (Constant)		43.842	.000				
Programs	.174	1.764	.081	.184	.177	.173	
Staff Experience	.166	1.688	.095	.185	.170	.166	
Structure	.113	1.147	.254	.114	.116	.113	
Model 2 (Constant)		49.203	.000				
Programs	-.025	-.252	.802	.184	-.026	-.022	
Staff Experience	.116	1.306	.195	.185	.134	.114	
Structure	.157	1.764	.081	.114	.180	.154	
Salary and Benefits	.286	2.737	.007	.387	.273	.239	
Continuing Education	.188	2.039	.044	.300	.207	.178	
Pre-Service Education	.225	2.331	.022	.388	.235	.204	

This suggests that the individual variables associated with Pre-Service Education, Salary and Benefits, and Continuing Education should be examined as a minimum set of predictors of ECERS Total Score. In these analyses using the unweighted composites, these three variables were necessary and sufficient predictors of ECERS Total Score. As was the case using the weighted scores in regression analyses, this implicates that the individual variables that composed the weighted factors and unweighted composites (e.g., teacher and director pre-service education, teacher and director annual hours in continuing education, teacher and director salary, benefits, and training budget per staff member) should all be examined as potential necessary predictors of ECERS. Although

Accreditation was included in the Continuing Education category in these unweighted score analyses, it will not be used as part of the minimum set of predictors due to no significant relation to ECERS Total Score in the weighted analyses and no significant, independent relationship with ECERS Total Score.

#### MINIMUM STRUCTURAL VARIABLE SOLUTION

In the multiple and stepwise regression analyses, both the weighted factors and unweighted composites for Salary and Benefits (i.e., director and teacher salary in the first year, annual training budget per staff member, and benefits), Pre-Service Education (i.e., percent of directors with BA's or more and percent of teachers with AA's or more), and Continuing Education (i.e., annual hours directors and teachers spend in training) were necessary and sufficient predictors of ECERS Total Score. Drawing from the predictive relations identified in the regression analyses using variable reduction techniques, the eight predictor variables associated with the significant weighted and unweighted composites were selected for additional regression analyses. From the Pre-Service Education factor, the percent of directors with a BA or more and the percent of classroom teachers with an AA or more were selected. From the Salary and Benefits factor, annual salary of directors in their first year, annual salary of teachers in their first year, benefits, and training budget per staff member were selected. Finally, from the Continuing Education factor, director annual hours in training and teacher annual hours in training were selected. Although Accreditation was included in the unweighted analyses, the lack of significant prediction associated with this variable in the weighted

analyses supported not including Accreditation in the minimum set of predictors. Additionally, it is important to note that use of the Continuing Education variables poses interpretive challenges because the variable is part of the computation of the ECERS Total Score. However, because of the conceptual relevance, the empirical strength of the variables demonstrated in the data reduction analyses, and current policy considerations (e.g., with a currently under-trained workforce, most standards aimed at improving quality in child care centers include this measure), the director and teacher annual hours in continuing education will be included in these analyses.

Multiple regression analyses were calculated using these eight predictor variables and the ECERS. This reduced model accounted for 28.3% of the variance in ECERS Total Score ( $p < .001$ ) (see Table 17). This model predicted a mere 0.6% less of the variance than the model that used the unweighted factor scores and 0.9% more of the variance than the model that used the weighted factor scores – both of which permitted inclusion of all 17 structural variables in the prediction model. As such, it provides a statistically supported small set of structural variables to use in standards promoting quality. Further, this set of variables was strongly implicated in conclusions drawn in the literature review section of this study.

Additional regression techniques were used to isolate the strength of particular variables in the prediction of the ECERS Total Score. The multiple regression identified that the provision of benefits (*partial*  $r = .25$ ,  $p = .015$ ) and teacher education (*partial*  $r = .24$ ,  $p = .018$ ) made significant unique contributions in the regression model. Additionally, director hours in training demonstrated modest predictive strength (*partial*  $r = .19$ ,  $p = .074$ ). To determine the strength of these relations, additional regression

analyses were conducted using stepwise entry techniques. When entering all variables at the same time, the stepwise regression analyses produced a two-variable solution model (Table 18). At the first step, primary classroom teacher education accounted for 15.7% of the variance in ECERS Total Score ( $p = .000$ ) and benefits accounted for an additional 7.3% of the variance for a total of 23% of the variance ( $p = .003$ ). This only left 5.3% of the variance associated uniquely with the other six variables.

**Table 17: Multiple Regression Analyses with Teacher and Director Salary, Benefits, Training Budget per Staff Member, Teacher and Director Pre-Service Education, and Teacher and Director Continuing Education as Predictors of ECERS Total Score**

<i>R</i>	<i>R</i> <sup>2</sup>	<i>R</i> <sup>2</sup> Change	<i>F</i> Change		<i>df</i> 1	<i>df</i> 2	Sig. <i>F</i> Change
.532	.283	.283	4.487		8	91	.000
		Standardized Coefficients (Beta)	<i>T</i>	Sig.	Zero-order Correlation	Partial Correlation	Part Correlation
(Constant)			5.317	.000			
# benefits		.249	2.492	.015	.354	.253	.221
% teachers with AA+		.254	2.399	.018	.397	.244	.213
Director hours in training		.186	1.806	.074	.268	.186	.160
Training budget per staff		.114	1.133	.260	.225	.118	.101
% directors with BA+		.090	.933	.353	.220	.097	.083
Teacher salary		.055	.470	.640	.264	.049	.042
Director salary		-.044	-.383	.703	.185	-.040	-.034
Teacher hours in training		-.043	-.383	.703	.191	-.040	-.034

**Table 18: Stepwise Multiple Regression Using Teacher and Director Salary, Benefits, Training Budget per Staff Member, Teacher and Director Pre-Service Education, and Teacher and Director Continuing Education as Predictors of ECERS**

Model	<i>R</i>	<i>R</i> <sup>2</sup>	<i>R</i> <sup>2</sup> Change	<i>F</i> Change	<i>df</i> 1	<i>df</i> 2	Sig. <i>F</i> Change
1. % teachers with AA+	.397	.157	.157	18.298	1	98	.000
2. % teachers with AA+ and # benefits	.480	.230	.073	9.161	1	97	.003
	Standardized Coefficients (Beta)	<i>T</i>	Sig.	Zero-order Correlation	Partial Correlation	Part Correlation	
Model 1 (Constant)		24.963	.000				
% teachers with AA+	.397	4.278	.000	.397	.397	.397	
Model 2 (Constant)		15.053	.000				
% teachers with AA+	.332	3.627	.000	.397	.346	.323	
# benefits	.277	3.027	.003	.354	.294	.270	

To determine the impact of order of entry, multiple regression analyses were calculated first entering the two primary structural predictor variables, teacher education and benefits, and then the other six variables and vice versa. When the two primary variables were entered first as a block, the addition of the six other variables in a second step did not significantly add to the prediction of ECERS Total Score (see Table 19). On the other hand, the addition of the two primary variables as a block after entering the other six predictor variables as a block continued to significantly add to the prediction of ECERS Total Score, and the six other variables were significant predictors when not controlling for staff education and provision of benefits (see Table 20). When examining the predictive relations for teacher education and benefits, regression analyses revealed that the order of entry did not matter. Both predictive variables continued to significantly predict the ECERS Total Score after controlling for the other variable.

This suggests that teacher education and benefits equally and independently predict quality and should be given equal weights as determinants of quality. The other structural variables do not matter in predicting quality after accounting for the relation with teacher education and benefits. Therefore, only teacher education and benefits provide enough statistically significant prediction of quality and are a sufficient and crucial reduced set of predictors. In fact, a review of the partial and part correlations demonstrate how relations between teacher education and benefits to ECERS Total Score remain high after accounting for multiple combinations of controlling for the other six variables (see Table 18).

Because some studies have found weaker relations between center level assessments of teacher education (Kontos & Fiene, 1987) compared to studies using the educational level of the teacher in the classroom assessed for quality (Burchinal et al. 1997), an additional regression analysis was performed using benefits and the categorized educational level of the classroom teacher rather than the center level variable of percent of teachers with Associates degrees or more. This model accounted for only 13.6% of the variance in ECERS Total Score compared to 23% when using the center level teacher education variable (see Table 21). This finding supports the conclusion that the center's general investment in direct teaching staff and the degree to which staff professional preparation is supported has a stronger influence on quality rather than the work of an individual teacher in an isolated classroom environment.

**Table 19: Multiple Regression Analyses when Primary Classroom Teacher Education and Benefits Are Entered First as a Block**

Model		<i>R</i>	<i>R</i> <sup>2</sup>	<i>R</i> <sup>2</sup> Change	<i>F</i> Change	<i>df</i> 1	<i>df</i> 2	Sig. <i>F</i> Change
1. # benefits and % teachers with AA+		.480	.230	.230	14.491	2	97	.000
2. # benefits, director and teacher education, director and teacher salary, director and teacher hours in training, training budget per staff		.532	.283	.053	1.117	6	91	.359
Model	Standardized Coefficients (Beta)	<i>T</i>	Sig.	Zero-order Correlation	Partial Correlation	Part Correlation		
Model 1		15.053	.000					
% teachers with AA+	.332	3.627	.000	.397	.346	.323		
# benefits	.277	3.027	.003	.354	.294	.270		
Model 2		5.317	.000					
% teachers with AA+	.254	2.399	.018	.397	.244	.213		
# benefits	.249	2.492	.015	.354	.253	.221		
% directors with BA+	.090	.933	.353	.220	.097	.083		
Teacher salary	.055	.470	.640	.264	.049	.042		
Director salary	-.044	-.383	.703	.185	-.040	-.034		
Training budget per staff	.114	1.133	.260	.225	.118	.101		
Director hours in training	.186	1.806	.074	.268	.186	.160		
Teacher hours in training	-.043	-.383	.703	.191	-.040	-.034		

**Table 20: Multiple Regression Analyses when Primary Classroom Teacher Education and Benefits Are Entered Second as a Block**

Model	R	R <sup>2</sup>	R <sup>2</sup> Change	F Change	df1	df2	Sig. F Change
1. director education, director and teacher salary, director and teacher hours in training, training budget per staff	.426	.181	.181	3.431	6	93	.004
2. # benefits, director and teacher education, director and teacher salary, director and teacher hours in training, training budget per staff	.532	.283	.102	6.448	2	91	.002
Model	Standardized Coefficients (Beta)	T	Sig.	Zero-order Correlation	Partial Correlation	Part Correlation	
Model 1 (Constant)		4.408	.000				
Directors with BA+	.169	1.712	.090	.220	.175	.161	
Teacher salary	.204	1.786	.077	.264	.182	.168	
Director salary	.007	.062	.951	.185	.006	.006	
Training budget per staff	.103	.970	.335	.225	.100	.091	
Director hours in training	.193	1.776	.079	.268	.181	.167	
Teacher hours in training	.072	.642	.522	.191	.066	.060	
Model 2 (Constant)		5.317	.000				
Directors with BA+	.090	.933	.353	.220	.097	.083	
Teacher salary	.055	.470	.640	.264	.049	.042	
Director salary	-.044	-.383	.703	.185	-.040	-.034	
Training budget per staff	.114	1.133	.260	.225	.118	.101	
Director hours in training	.186	1.806	.074	.268	.186	.160	
Teacher hours in training	-.043	-.383	.703	.191	-.040	-.034	
Teachers with AA+	.254	2.399	.018	.397	.244	.213	
# benefits	.249	2.492	.015	.354	.253	.221	



**Table 21: Multiple Regression Using Classroom Teacher Education and Benefits to Predict ECERS Total Score**

Model	<i>R</i>	<i>R</i> <sup>2</sup>	<i>F</i> Change	<i>df</i> 1	<i>df</i> 2	Sig. <i>F</i> Change
education of teacher, number of benefits	.369	.136	7.327	2	93	.001
	Standardized Coefficients (Beta)	<i>t</i>	Sig.	Zero-order Correlation	Partial Correlation	Part Correlation
(Constant)		9.330	.000			
# benefits	.343	3.530	.001	.354	.344	.340
education of classroom teacher	.103	1.062	.291	.143	.109	.102

To determine whether the interaction of benefits and teacher education significantly predicted quality, multiple and stepwise regression analyses including an interaction variable were conducted, resulting in the use of nine variables to predict ECERS. The multiple regression equation was significant with the inclusion of the interaction term, accounting for 30% of the variance (see Table 22). Stepwise regression analyses revealed that the interaction term for benefits and teacher education significantly predicted ECERS and accounted for 23% of the variance (see Table 23). This suggests that sites that provide a number of benefits and have a high percentage of teachers with at least an Associate Degree have particularly high quality compared to sites without such a combination of structural characteristics.

**Table 22: Multiple Regression with Interaction Term for Teacher Education and Benefits and Teacher and Director Salary, Benefits, Training Budget per Staff Member, Teacher and Director Pre-Service Education, and Teacher and Director Continuing Education as Predictors of ECERS Total Score**

<i>R</i>	<i>R</i> <sup>2</sup>	<i>R</i> <sup>2</sup> Change	<i>F</i> Change	<i>df</i> 1	<i>df</i> 2	Sig. <i>F</i> Change
.543	.295	.295	4.183	9	90	.000
	Standardized Coefficients (Beta)	<i>t</i>	Sig.	Zero-order Correlation	Partial Correlation	Part Correlation
(Constant)		5.437	.000			
Interaction term for benefits * education	.290	1.242	.217	.483	.130	.110
Director hours in training	.189	1.842	.069	.268	.191	.163
# benefits	.126	.893	.374	.354	.094	.079
Training budget per staff	.110	1.092	.278	.225	.114	.097
% directors with BA+	.094	.972	.334	.220	.102	.086
Teacher salary	.068	.582	.562	.264	.061	.051
Director salary	-.064	-.554	.581	.185	-.058	-.049
Teacher hours in training	-.057	-.511	.611	.191	-.054	-.045
% teachers with AA+	.048	.244	.808	.397	.026	.022

**Table 23: Stepwise Multiple Regression with Interaction Term for Teacher Education and Benefits and Teacher and Director Salary, Benefits, Training Budget per Staff Member, Teacher and Director Pre-Service Education, and Teacher and Director Continuing Education as Predictors of ECERS Total Score**

Model	<i>R</i>	<i>R</i> <sup>2</sup>	<i>F</i> Change	<i>df</i> 1	<i>df</i> 2	Sig. <i>F</i> Change
Interaction term for benefits * education	.483	.233	29.754	1	98	.000

Next, the structural predictors were categorized a priori as a) staff education, composed of staff and director pre-service and continuing education and b) financial investment practices, composed of benefits, annual training budget per staff member, and staff and director 1<sup>st</sup> year salary. Previous research has found variables representing both of these categories important in predicting quality, so the goal of these analyses was to determine the relative strength of the categories of variables. When the staff education variables were entered first, staff education was a significant predictor but financial investment practices was only moderately predictive of ECERS Total Score (see Table 24). However, when financial investment practices were entered first, both sets of variables significantly added to the prediction of ECERS Total Score (see Table 25). This suggests that the educational variables as a block should be given more consideration as determinants of quality compared to the center financial investment practices. Staff pre-service education is the necessary and sufficient predictor and center financial investments add little in addition.

**Table 24: Stepwise Regression with Staff Education Entered First as a Block to Predict ECERS Total Score and with Financial Investment Practices Entered Second as a Block**

Model	<i>R</i>	<i>R</i> <sup>2</sup>	<i>R</i> <sup>2</sup> Change	<i>F</i> Change	<i>df</i> 1	<i>df</i> 2	Sig. <i>F</i> Change
1. Staff education block	.463	.214	.214	6.469	4	95	.000
2. Financial investment with Staff education block	.532	.283	.069	2.182	4	91	.077
Model	Standardized Coefficients (Beta)	T	Sig.	Zero-order Correlation	Partial Correlation	Part Correlation	
Model 1 (Constant)		12.612	.000				
% directors with BA+	.127	1.339	.184	.220	.136	.122	
% teachers with AA+	.327	3.299	.001	.397	.321	.300	
Director hours in training	.206	2.051	.043	.268	.206	.187	
Teacher hours in training	.006	.060	.953	.191	.006	.005	
Model 2 (Constant)		5.317	.000				
% directors with BA+	.090	.933	.353	.220	.097	.083	
% teachers with AA+	.254	2.399	.018	.397	.244	.213	
Director hours in training	.186	1.806	.074	.268	.186	.160	
Teacher hours in training	-.043	-.383	.703	.191	-.040	-.034	
Teacher salary	.055	.470	.640	.264	.049	.042	
Director salary	-.044	-.383	.703	.185	-.040	-.034	
Training budget per staff	.114	1.133	.260	.225	.118	.101	
# benefits	.249	2.492	.015	.354	.253	.221	

**Table 25: Financial Investment Practices Entered First as a Block to Predict ECERS Total Score with Staff Education Is Entered Second**

<b>Model</b>	<b><i>R</i></b>	<b><i>R</i><sup>2</sup></b>	<b><i>R</i><sup>2</sup> Change</b>	<b><i>F</i> Change</b>	<b><i>df</i>1</b>	<b><i>df</i>2</b>	<b>Sig. <i>F</i> Change</b>
Financial investment	.428	.183	.183	5.327	4	95	.001
Financial investment with Staff education	.532	.283	.100	3.162	4	91	.018
<b>Model</b>	<b>Standardized Coefficients (Beta)</b>	<b>T</b>	<b>Sig.</b>	<b>Zero-order Correlation</b>	<b>Partial Correlation</b>	<b>Part Correlation</b>	
<b>Model 1 (Constant)</b>		5.797	.000				
Teacher salary	.136	1.187	.238	.264	.121	.110	
Director salary	-.012	-.100	.920	.185	-.010	-.009	
Training budget per staff	.187	1.987	.050	.225	.200	.184	
# benefits	.303	2.970	.004	.354	.291	.275	
<b>Model 2 (Constant)</b>		5.317	.000				
Teacher salary	.055	.470	.640	.264	.049	.042	
Director salary	-.044	-.383	.703	.185	-.040	-.034	
Training budget per staff	.114	1.133	.260	.225	.118	.101	
# benefits	.249	2.492	.015	.354	.253	.221	
% directors with BA+	.090	.933	.353	.220	.097	.083	
% teachers with AA+	.254	2.399	.018	.397	.244	.213	
Director hours in training	.186	1.806	.074	.268	.186	.160	
Teacher hours in training	-.043	-.383	.703	.191	-.040	-.034	

## PREDICTION TO ECERS CATEGORIES

The goal of the next set of analyses was to determine whether the minimum set of eight predictor variables could be used to discriminate between categories of quality in child care centers. Child care centers were classified into one of three ECERS categories – “Poor,” “Mediocre,” and “Good.” Sites scoring equal to or less than 3 on the ECERS Total Score were classified as “Poor;” sites scoring between 3 and 5 were classified as “Mediocre;” and sites scoring above 5 were classified as “Good.” In seeking to determine a simple way to assess quality, it would be useful to be able to use a few structural predictors to classify whether a site fell within one of these ranges of quality.

Discriminant analysis was used to determine multivariate relations between the eight predictors (e.g., director and teacher pre-service education, director and teacher continuing education, director and teacher salary, benefits, and training budget per staff) and ECERS categories. The model predicted 52% of the cases correctly and was more accurate at predicting “Poor” and “Good” quality sites (see Table 26). For sites that had poor quality (i.e., ECERS Total Score = 2 – 3), the 8-variable solution was accurate 63% of the time. For sites with mediocre quality, the discriminant function was accurate only 45% of the time. The 13 “Good” quality sites were accurately classified 77% of the time. Thus, the 8-variable solution was more effective in predicting ECERS groups at the extremes.

**Table 26: Discriminant Analysis with Eight Variables Used to Predict ECERS Total Score**

Original ECERS group categories	Predicted Group Membership			Total
	Poor	Mediocre	Good	
Poor	62.5% (10)	31.3% (5)	6.3% (1)	16
Mediocre	33.8% (24)	45.1% (32)	21.1% (15)	71
Good	7.7% (1)	15.4% (2)	76.9% (10)	13

52.0% of original grouped cases correctly classified.

### THRESHOLD ANALYSES

A one-way ANOVA was calculated with the three ECERS quality groups (i.e., less than 3 = “Poor”; 3 – 5 = “Mediocre”; and greater than 5 = “Good”) as the factor and the eight variables in the minimum set of predictors as the dependent variables. With the exception of training budget per staff member, each variable evidenced a trend of increasing value as quality category increased (see Table 27). Significant differences were evident for Teacher Pre-Service Education, Training Budget per Staff, Number of Benefits provided, and the interaction of Teacher Pre-Service Education and Number of Benefits provided. Additionally Director Hours in Training showed modest significance ( $p = .065$ ). In particular, Bonferroni post-hoc analyses revealed that the mean values for each structural variable were much higher for the “Good” sites compared to the “Poor” sites (see Table 27). For the strongly predictive variables of percent teachers with AA’s or more, this suggests that appropriate cut-offs to distinguish “Poor,” “Mediocre,” and “Good” sites might be less than 36%, between 36% and 52%, and above 52%. For benefits, the appropriate cut-offs would be less than 3 benefits, between 3 and 5 benefits, and greater than 5 benefits. As the interaction term for teacher education and benefits increased, the ECERS increased disproportionately. Thus, teacher pre-service education and number of

benefits appeared to be useful in discriminating between ECERS groups as well as their interaction, and training budget per staff member was moderately effective in discriminating between ECERS groups.

## APPLICATION TO PRESCHOOLS

One of the goals of this study was to determine whether the structural variables that best predict quality in child care centers would predict similarly in preschools in Pennsylvania. Percent of teachers with Associate's Degrees or more and number of benefits provided by the preschool accounted for 13.9% of the variance ( $p = .073$ ) in multiple regression analyses compared to 23% of the variance predicted in child care centers (see Table 28). It seems that that the factors that predict quality in centers are not as important in preschools; however, the small sample size precludes drawing firm conclusions. Further, the educational background of teachers in preschools was much higher than in centers. On average, over 60% of the teachers in preschools had at least an Associate Degree with over half having a Bachelor Degree or higher. In comparison, only 37% of teachers in centers had at least an Associate Degree with only 19% having a Bachelor degree or hire (see Table 29). Because of the different regulations required in preschools vs. child care centers, this may force other factors besides education to serve as better predictors of quality in preschool environments



**Table 27: ANOVA Differences in Director and Director and Teacher Pre-Service Education and Director and Teacher Continuing Education, Director and Teacher Salary, Benefits, Training Budget per Staff, and the Interaction of Teacher Education and Benefits in Child Care Centers of Poor, Mediocre, and Good Quality**

Variable	Quality Category	N	Mean	Sig.	Significant Analyses	Post-Hoc
Director hours in training	Poor	16	18.75	.065	Poor – Good = .087	
	Mediocre	71	22.59			
	Good	13	36.00			
	Total	100	23.72			
Teacher hours in training	Poor	16	11.06	.663	N/A	
	Mediocre	71	12.15			
	Good	13	13.31			
	Total	100	12.13			
Director salary	Poor	16	21957.7538	.310	N/A	
	Mediocre	71	23295.3952			
	Good	13	25321.8869			
	Total	100	23344.8165			
Teacher salary	Poor	16	16276.3075	.156	N/A	
	Mediocre	71	16679.1921			
	Good	13	18511.4077			
	Total	100	16852.9186			
# benefits	Poor	16	3.0625	.005	Poor – Good = .006 Mediocre – Good = .011	
	Mediocre	71	3.5588			
	Good	13	5.0769			
	Total	100	3.6768			
Directors with BA+	Poor	16	.6406	.200	N/A	
	Mediocre	71	.6924			
	Good	13	.8609			
	Total	100	.7060			
Teachers with AA+	Poor	16	.2383	.023	Poor – Good = .018	
	Mediocre	71	.3674			
	Good	13	.5285			
	Total	100	.3677			
Training budget per staff	Poor	16	71.6272	.009	Poor – Good = .045	
	Mediocre	71	70.3337			
	Good	13	139.9294			
	Total	100	79.5881			
Interaction of teachers with AA + and # benefits	Poor	16	.8700	.000	Poor – Good - .000 Mediocre – Good - .000	
	Mediocre	71	1.3409			
	Good	13	2.9006			
	Total	100	1.4683			

**Table 28: Multiple Regression Analyses for Quality in Preschools Predicted by Percent of Teachers with AA's or More and Benefits**

	<i>R</i>	<i>R</i> <sup>2</sup>	<i>F</i> Change	df1	df2	Sig. <i>F</i> Change
% teachers with AA or more and number of benefits provided	.372	.139	2.819	2	35	.073

**Table 29: Percentage of Teachers with at Least an Associate Degree and at least a Bachelor Degree in Child Care Centers and Preschools**

Type of Care	Associate Degree or More			Bachelor Degree or More		
	Mean %	Range	Standard Deviation	Mean %	Range	Standard Deviation
Child Care Centers ( <i>N</i> = 100)	36.8%	0 – 100%	.285	19.4%	0 – 80%	.201
Preschools ( <i>N</i> = 38)	64.4%	0 – 100%	.327	53.1%	0 – 100%	.384

## DISCUSSION

The goal of this study was to: 1) investigate relations between structural characteristics and quality of early childhood classroom environments, 2) determine a minimum set of structural predictors, 3) discover whether structural factors could be used to predict categories of quality, 4) identify whether threshold values of structural characteristics could discriminate between categories of quality, and 5) determine whether a minimal set of structural characteristics that predict quality in child care centers could be used to predict quality in preschools. The study focused on quality in child care center classrooms for 3- to 5-year-olds and examined whether ECERS Total Score could be predicted by a minimum set of the total 17 center-level structural variables.

### STRUCTURAL PREDICTORS OF QUALITY

In this study of 100 child care center classrooms for 3- to 5-year-olds, teacher and director pre-service education, teacher and director continuing education, teacher and director wages, provision of benefits to staff, and training budget per staff member consistently predicted quality. A combination of weighted and unweighted regression analysis techniques that used 17 structural predictors clarified that the aforementioned eight structural characteristics of centers predicted between 27.4% and 28.9% of the

variance in ECERS Total Score. Yet, even within this smaller set of eight structural predictors, two structural characteristics (percent of teachers in the center that have an Associate Degree or higher and the number of benefits) most strongly accounted for variance in quality across sites. Further, the interaction of benefits and teacher education was singularly most predictive of quality, suggesting that centers that had more teachers with at least an Associate degree and that provided more benefits to staff had particularly high quality compared to other centers without this combination of structural characteristics.

It is clear that centers that have many teachers with an Associate Degree or higher and that provide an ample benefits package are major predictors of quality. However, the interaction of teacher education and benefits also is very relevant. Essentially, quality improves disproportionately as both percentage of teachers with an Associate Degree or higher and the number of benefits provided to staff increase. The interaction of teacher education and benefits accounts for 23% of the variance in ECERS Total Score and essentially covers the influence of each of its components in predicting quality.

Yet, the combination of teacher education and benefits accounted for 23% of the variance in ECERS Total Score (when not including interaction), only 5.3% less than when using six additional variables related to staff pre-service education, continuing education, and center financial investment practices. However, it is important to note that 12.8% of the variance related to teacher education and benefits was due to their substantial overlap with the six other variables. Support for the strength of prediction of these variables also was provided in data reduction techniques, which used weighted and unweighted scores. In all cases, analyses led to the isolation of percent of teachers with

an Associate Degree or more and benefits as important structural predictors. Other variables did not predict when teacher education and benefits was controlled, and the two variables still predicted when others were controlled. Teacher education and benefits were necessary and sufficient in the prediction of quality.

The findings largely mirror what has been identified as strong structural predictors of quality in previous research with a few, notable exceptions. As expected from the literature, staff education was part of the minimal and necessary set of predictors of quality. Quality is inherent in characteristics of the caregiver, particularly the education of the teacher. Higher education supports the acquisition of appropriate knowledge, attitudes, and skills that help unrelated adults form positive relationships with young children and enable the caregiver to provide ample verbal and cognitive stimulation, to behave in a sensitive and responsive manner, and to give generous amounts of attention and support to groups of young children (National Research Council, Institute of Medicine, 2000). Educated directors know what behaviors to support in and model for their staff. Although quality is higher when the education comes through pre-service experiences, even continuing education experiences related to increased quality.

Additionally, this study lends further support to the role of center financial investments in staff, particularly via provision of benefits. Centers that invested in their staff by paying them well, providing a number of benefits, and allocating ample funding for continuing education were of higher quality. In particular, provision of benefits was an essential predictor of quality, and this was true over and above its overlap with teacher education.

Also similar to previous studies, this study identifies a number of structural characteristics of child care centers as being irrelevant in the prediction of quality. Specifically, director and teacher experience were not included in the minimum set of predictors. Also, best practices activities, such as providing transition-to-school activities, formally teaching particular child developmental skills, using developmental assessments, and promoting parent involvement, did not strongly predict quality. Finally, accreditation was not a necessary predictor.

While the finding that center financial investments in staff were essential predictors of quality matched previous research, it was somewhat surprising how these relations were demonstrated in this sample. Although previous research led to the expectation that teacher wages would predict quality, the provision of benefits was the necessary and sufficient characteristic within the block of center financial investment characteristics that predicted quality. None of the studies included in the review of literature had examined provision of benefits as a potential predictor. Rather, other studies examined relations between teacher wages and quality (Scarr et al., 1994; Phillips et al., 2000; Zill et al., 2003) and between training budgets and quality (Holloway et al. 2001) and found significant relations but missed the opportunity to learn about the impact of provision of benefits. Additionally, this study may not have demonstrated as much evidence of the necessity of teacher wages as a predictor of quality, because it used the wage of a first-year teacher rather than the highest wage paid to teachers differing from prior research that showed significant relations with maximum salary (Scarr et al., 1994; Phillips et al., 2000).

Also diverging from results found in previous studies, the classroom structural characteristics were not necessary and consistent predictors of quality. Although the Structure composite (composed of group size and teacher:child ratio) approached significance in a multiple regression using weighted composite scores, there were no other indications that ratio and/or group size were necessary predictors in this sample of preschool classrooms. Observing children in care from 15 to 36 months, the NICHD Early Child Care Research Network (2000) found that teacher:child ratio was the strongest and most consistent predictor of positive caregiving over time. However, the study also found that the strength of teacher:child ratio as a predictor waned in comparison to teacher characteristics by the time the children were 3-years-old. Since the children in the classrooms examined in this study were between 3- to 5-years-old, it is likely that teacher:child ratio no longer was a necessary and sufficient predictor of quality compared to teacher education. Finally, only five centers had ratios greater than 10 children per teacher. NAEYC recommends ratios of 1:7 – 1:10 for children between 30 months and five years in their Preschool Accreditation Strand ([http://www.naeyc.org/accreditation/naeyc\\_accred/draft\\_standards/defs/groupsize.html](http://www.naeyc.org/accreditation/naeyc_accred/draft_standards/defs/groupsize.html)), and PA DPW regulations require ratios of 1:10 for children between 37 months to six years (<http://www.dpw.state.pa.us/Child/ChildCare/003670565.htm>). Thus, most centers reported ratios that fell well within regulatory requirements for Pennsylvania, hence the limited variability in ratio data.

This study contributes substantially to the understanding of relations between teacher education and quality. In the review of studies relating teacher education to quality, a number of studies (Scarr et al., 1994; Burchinal et al., 2000; Phillips et al.,

2000; Holloway et al., 2001; Dunn, 1993; Zill et al., 2003) used the education of the individual classroom teacher rather than a center-level measure of percent of teachers with a particular level of education. These studies demonstrated significant relations between classroom teacher education and quality while one study that used the center-level characteristic of percentage of teachers with at least a Bachelor Degree (Kontos & Fiene, 1987) showed no relation. This study extended the understanding of the potential role of overall levels of teacher education in centers as a necessary and sufficient predictor of quality by demonstrating that the center-level characteristic of percentage of teachers with at least an Associate Degree was a better predictor than the education of the individual classroom teacher. Center-level characteristics can be used successfully to predict classroom-level quality, and it may be the overall culture of the center supports high quality learning environments, not just any one individual's efforts.

Further, although most previous research has found strong associations between quality and teachers with at least a Bachelor Degree (Burchinal et al., 2002), this study found associations with teachers with at least an Associate Degree (although it is likely that BA's would have been predictive as well). Percent of teachers with at least an Associate Degree was used in this study because, this is the more predominately available educational level among teachers in child care centers in Pennsylvania. As a check on the validity of this strategy, a multiple regression analysis with the 8-variable minimum set replacing percent of teachers with AA's or more with percent of teachers with BA's or more was conducted. This model only predicted 24.4% of the variance in ECERS Total Score compared to 28.3% when using percent of teachers with AA's or more. Having a higher percentage of teachers with at least an Associate Degree positively related to



quality in this sample of child care centers better than could be accounted for in a model using percentage of teachers with at least a Bachelor Degree.

### PREDICTING CATEGORIES OF QUALITY

Nevertheless, it is clear that the set of variables examined in this study in and of themselves do not fully discriminate between categories of quality. Holloway et al. (2001) employed discriminant analyses to determine whether responses to a telephone interview composed of questions derived from the ECERS could accurately categorize a center as being “Poor” (i.e., ECERS Total Score less than 3), “Mediocre” quality (i.e., ECERS Total Score between 3 and 5), and “Good” quality (i.e., ECERS Total Score higher than 5). Using responses to 13 questions posed in the telephone inventory, the researchers correctly classified 79.1% of the centers with a tendency to underestimate quality relative to the ECERS. Comparatively, this study, which used telephone interview responses about eight structural characteristics of care, only accurately predicted 52% of the centers. The structural predictors were better at predicting centers at the extremes, “Poor” and “Good,” compared to within the “Mediocre” range. As such, assessment of the eight structural characteristics could be used as a shorthand method to screen for sites in the “Poor” range that are in need of intervention services to promote child outcomes.

Although better than chance, the modest prediction of ECERS categories highlights this study’s weakness – quality was challenging to predict using only these structural characteristics. Over 72% of the variance in quality was not explained by the minimum set of eight structural variables. However, the significant prediction of 28.3%

of the variance is in line with that found in previous studies and can be used to inform the development of quality standards for child care centers.

#### IDENTIFYING THRESHOLDS OF STRUCTURAL CHARACTERISTICS THAT DISCRIMINATE QUALITY

This study demonstrated that differences in teacher pre-service education, director continuing education, the number of benefits provided, amount allocated for training of staff, and the interaction of teacher pre-service education and provision of benefits significantly identified differences primarily between poor and good quality sites. Previous research clearly has identified that “more is better” when it comes to relations between a number of structural characteristics (i.e., child:staff ratios, teacher education, teacher training, etc.) and quality but has not successfully identified thresholds, or cut-off points, to distinguish between poor, mediocre, and high quality sites (NICHD Early Child Care Research Network, 1999). This study extends the research by successfully demonstrating that differences between poor and good quality and between mediocre and good quality could be distinguished by a particular number of benefits and the interaction of teacher pre-service education and benefits and that the difference between poor and good quality also could be distinguished by the percentage of teachers with at least an Associate Degree, director annual hours in training, and the training budget allocated per staff person. These findings can be used, if replicated in additional research, as the basis to develop cut-off values in standards for tiered quality improvement systems.

## PREDICTION OF QUALITY IN PRESCHOOLS

The small number of preschools in this sample (38) limited the ability to use a number of structural characteristics in a model to predict quality. Thus, the study used the necessary and sufficient variables of percentage of teachers with at least an Associate Degree and provision of benefits identified as relevant for child care centers. Although the two-variable model approached significance in predicting quality in preschools, it accounted for substantially less of the variance compared to child care centers. The findings suggest that the higher regulation of teacher education in preschools leads to other structural characteristics becoming more important in the prediction of quality. As more teachers in child care centers obtain more education, it may be necessary to refine standards in a tiered quality improvement strategy to address other aspects of care that can support high quality and thereby improve child school readiness outcomes. Because of the limited sample size, other potential structural predictors could not be explored in the preschool sample.

## IMPLICATIONS OF THE STUDY

This study confirms much of our understanding about structural predictors of quality in child care centers. Specifically, teacher education and center financial investments in staff serve as the most important structural characteristics that support a quality environment. These findings are similar to parent and/or family characteristics that have been found to strongly relate to child academic achievement.

One of the primary factors associated with success in school is parental education (Mehaffie & McCall, 2002). Other parenting factors that relate to academic success in school are maternal sensitivity and warmth, stimulation of language and academic behavior, and provision of appropriate play materials (Bradley & Caldwell, 1976). Children from high-income families experience more verbal stimulation than children from low-income homes, so the children from high-income families develop substantially greater vocabulary skills - a vocabulary of 1,116 words around 3 years of age compared to a vocabulary of 525 words for children from low-income families (Hart & Risley, 2003). The differences lead to an ever-increasing gap in vocabulary growth over time (Hart & Risley, 2003). This study extends our understanding of child development to suggest that the educational background of other significant adults in young children's lives (e.g., child care teachers) has similar relations to children's development – at least in understanding that more educated adults provide more stimulating, interactive “high quality” environments compared to their less educated counterparts. As Zill et al. (2003) found, teacher education impacts the learning environment because it helps teachers acquire more developmentally appropriate knowledge and attitudes about young children.

Further, growing up in poverty is one of the most consistent factors associated with compromised development in developmental research (National Research Council, Institute of Medicine, 2000). Research on children in poverty has revealed that increasing the incomes of low-income parents improves the odds of successful early development (National Research Council and Institute of Medicine, 2000). Similarly, this study shows that teachers in centers that provide more financial resources to them (either directly via

salaries or indirectly via benefits and provision of professional development opportunities) tend to be of higher quality that would support child development.

Yet, this study diverges from previous studies in identifying provision of benefits as being the most important aspect of center financial investments in staff that relate to quality. Parental stress can disrupt parenting skills and the nature of the relationship between young children and their parents. Applying the role of stress to the child care environment, the emergence of provision of benefits as a primary predictor of quality may be due to the recent crisis in health care in the United States. Simply put, the predominately young women teachers in child care centers who have access to a good benefits package may feel significantly less stressed in their teaching roles than their counterparts who do not receive benefits. Wages generally are low in most child care centers in this study, but having a good benefits package that provides health care for self and family may relate to reduced turnover, which has been found to relate to reduced quality (National Research Council, Institute of Medicine, 2000). Since the child care teachers generally were modestly educated and lacked access to high-paying jobs, these women may have felt more secure and stable knowing that their families' health needs could be met; thus, they may be better able to respond to the care and learning demands of the young children in their charge on a daily basis. Clearly, the role of benefits needs to be examined in future research to clarify relations with turnover, wages, and teacher stress.

### Implications for Practice

Teacher education and provision of benefits were necessary and sufficient predictors of quality in this sample as well as their interaction, and this has major implications for practice. First, as child care has shifted to be more of a child development program rather than a service to support parental employment, it is clear that minimum educational standards for teachers must be addressed (Gallagher, Rooney & Campbell, 1999). This study suggests that the Associate Degree should be the minimal standard to promote quality environments known to predict school readiness outcomes. Although continuing education is important, Burchinal et al. (2002) found that the teachers without a college degree who attended workshops were still rated as less sensitive and as providing lower quality than teachers with college degrees who did not attend workshops. Pre-service education is the key to promoting quality and may be preferred to attempts to “train” undereducated workers once on the job.

Second, if the early child care and education field is to remain staffed primarily by paraprofessionals rather than certified “teachers,” this study implies that mechanisms to provide decent benefits to all workers should be implemented. For a long time, much of the debate in this field has focused on compensation and how to improve child care workers’ wages to improve quality. This study suggests another way to intervene, in lieu of compensation, by developing comprehensive, affordable access to benefits.

Finally, it is important to note that quality substantially and disproportionately increased as both the percentage of teachers with an Associate Degree or higher and the provision of benefits increased. In fact, the interaction of these variables was necessary

and sufficient in predicting quality. Sites that had high values for both of these structural characteristics were far more likely to be rated as “good” quality. Thus, this study suggests that supporting improvements in both these areas may substantially improve quality.

### Implications for Keystone STARS

Thus, this study has major implications for Keystone STARS standards and Pennsylvania efforts to improve the quality of child care. This study strove to look specifically at variables related to the Pennsylvania child care quality improvement initiative in a Pennsylvania sample of centers and preschools, and a sub-goal was to determine how well the current standards in Keystone STARS will support quality and if appropriate, to propose how the standards should be considered and given weight in importance relative to one another. The study clearly highlights the importance of the Staff Qualifications and Compensation and reduces the relative importance of Learning Environment, Partnerships with Family and Community, Administration, and Continuous Quality Improvement as predictors of quality and thereby child development. No one would argue that the other categories of Keystone STARS should not be encouraged, but they do not seem to predict quality as measured by the ECERS to a substantial degree in this sample of child care centers in Pennsylvania.

Applying the results to Keystone STARS standards leads to two major changes in the standards. First, the Staff Qualifications and Compensation domain should be given greater weight in the scale determining STAR level than currently occurs. Currently, a site must meet all criteria in all domains within a particular STAR level to obtain that

tiered recognition. To promote high quality environments that support child learning, this may not be necessary. Instead, high percentages of teachers with at least an Associate degree and provision of a number of benefits is necessary and sufficient in this sample. Second, the threshold analyses reveal that the current criteria for Compensation may need to be amended. In Keystone STARS, child care centers at the highest level need only provide at least three benefits; however, this study shows that “high quality” centers are distinguished by providing five or more benefits. The relevance of these recommendations should be tested within the monitoring and evaluation of the Keystone STARS initiative.

#### LIMITATIONS OF THE STUDY

In addition to the low prediction of variance, there are several limitations to this study that limit the ability to draw firm conclusions. First, the study is based on self report of center and staff characteristics. Although the directors were sent a list of questions for which they needed to gather relevant data prior to the telephone interview, it is not clear whether directors actually consulted their records to provide responses to many of the survey questions. For instance, some directors might have reported about annual hours spent in training based on their knowledge of the Department of Public Welfare regulations rather than actual participation rates. If that were the case, this clearly would have eroded the use of teacher and director annual hours in continuing education as a structural predictor of quality. Future studies should seek to validate the self report by



checking documentation. Perhaps, if the information had been verified by a visit, stronger predictive relations may have been discovered.

Second, the structural variables relied on using center characteristics to predict the quality of one specific classroom, center-level variables to predict one classroom-level quality. Because individual teachers have large control over what happens in their classrooms, stronger relations may have been found if the classroom-level structural predictors had been used in analyses. In fact, there were some discrepancies in what was reported at the center level vs. the classroom level (i.e., for the 50 sites that had no curriculum evident during the classroom observations, 96% of telephone interviewees responded that the center used a curriculum or some other written materials in preschool classrooms). Yet, the center teacher education measure was better at predicting quality than was the classroom teacher's education. In fact, Cryer et al. (1999) demonstrated that center-level structural variables, indeed, were better predictors of quality than were classroom-level predictors in a study of quality in four different countries. Additional research should be conducted to explore the relative predictive value of center-level vs. classroom-level structural characteristics.

Third, selection effects cause serious challenges in drawing firm conclusions from this correlational study. Staff education and center financial investments in staff were the necessary and sufficient predictors of quality. Pertaining specifically to teacher education, it remains unclear whether high quality centers select more highly educated staff who have other characteristics that relate to quality of the learning environment and child development that are not addressed in this study, such as less depression. Further, centers that are known for hiring highly educated teachers and that provide good benefits are

likely to have professionals that self select to teach in those centers. In future studies, it may be important to measure other teacher characteristics, such as mental health and motivation, to determine their relations with quality relative to teacher education (National Research Council, Institute of Medicine, 2000).

This study has implications for policy, but those implications are based on the assumption that teacher education and benefits cause increased quality (i.e., raising them will improve quality). However, this study is observational, and these data alone are not sufficient to infer causality. The other variables associated with teacher education and benefits could contribute to improved quality. Specifically, it could be that parents who are educated select child care centers with educated teachers, and parent education, rather than teacher education actually promotes positive child outcomes. Similarly, it may be that sites that provide a number of benefits to staff charge higher parent fees, which only parents of higher socioeconomic status can afford. In this case, it would be the family's socioeconomic status and its correlates that would play the causal role in promoting school readiness. Nonetheless, the body of evidence provided by intervention studies suggests that structural characteristics can, indeed, support child development. In the intervention studies, family factors are the same for both the children involved in the intervention and those to whom they are compared, and the results show that the children in the high quality intervention programs show improved developmental outcomes over time (Campbell et al., 2001).

Finally, it is important that this study not lead to underemphasizing the importance of teacher:child ratio. There is a significant body of research that has found that this is very important in predicting quality when working with young children.

Although ratio becomes less strongly and uniquely related to quality as children become preschoolers (NICHD Early Child Care Research Network, 2000), this highly regulated structural characteristic of care should not be viewed as unnecessary in prediction of quality based on the results of this study.

## CONCLUSIONS

Child care is an increasingly common experience for young children with over 60% of children under the age of five in Pennsylvania experiencing some kind of out-of-home care setting (Weinraub et al., 2002). This study shows that these environments can be staffed and financially supported in such a way that promotes child cognitive, language, and social development. In particular, this study indicates the importance of initiatives aimed at increasing teacher education, particularly pre-service education, and improving benefits for child care staff as a means to improve the quality of care. Further, highly educated teachers are likely to provide many other important activities, such as helping children and parents transition to kindergarten. Although best practices, such as use of curricula, promoting transition to school, and involving parents, are important aspects of care, quality improvement initiatives should focus explicitly on increasing the percentage of teachers with at least an Associate Degree as a primary quality support. The national Head Start goal is correct – to have all teachers with at least an Associate Degree by 2010 – and should be supported in policy and in practice.

Drawing from ecological systems theory, this study demonstrates how children's experiences and development can be influenced potentially more strongly by the system

of relationships within the mesosystem compared to the microsystem (Bronfenbrenner, 1989). Center-level characteristics of care (e.g., benefits and center-wide teacher education) successfully predicted quality. In fact, one particularly intriguing and unexpected finding was that the general education of teachers throughout a center had greater relations to quality than the education of the classroom teacher. Decades of research have identified the importance of the individual caregiver. Yet, this study hints that “It takes a village to raise a child” ... or, at least a center.

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## APPENDIX A – SURVEY INSTRUMENTS

### **Early Childhood Task Force Early Care & Education Provider Survey – Center Care, Preschools, & Head Start**

#### **Introduction**

Hello, you should have received a letter from the Governor's Office last week informing you that University of Pittsburgh specialists would call to ask you to complete a telephone survey to assess needs in early care and education across the state. Specifically, we are asking that you participate in this telephone interview to gather information that would be available to inform state policies. As a way of thanking you for completing this survey, we will send you a \$25 check.

We want to assure you that, while the surveys ask for identifying information, we don't intend to release identifying information to anyone for any purpose, except the research team or in the unlikely event they would be subpoenaed. We ask for this information in case we have any questions regarding your responses and need to contact you directly.

This interview will take about 30 minutes. Is this a good time to complete it? [IF NOT, SCHEDULE A CALL BACK TIME.]

Do you have any questions before we get started?

Great, just let me clarify some information about your center. Your name is ..., and your center is ..... [CLARIFY THE NAME OF RESPONDENT, TELEPHONE NUMBER, ORGANIZATION, TYPE OF SITE, PROFIT STATUS, AND REGISTRATION STATUS BASED ON SPREADSHEET INFORMATION.]

#### Respondent information

Name of respondent: \_\_\_\_\_

Telephone number: \_\_\_\_\_

Organization: \_\_\_\_\_

## Type of Site

INTERVIEWER – INDICATE THE TYPE OF SITE BY CHECKING THE APPROPRIATE BOX

- ☐ Child Care Center (13 or more children)
- ☐ Head Start or Early Head Start
- ☐ Preschool/Nursery School

1. What is your title? [ASK IN INTRODUCTION]
  - a. Director
  - b. Assistant Director
  - c. Program Coordinator
  - d. Home caregiver
  - e. Other (specify) \_\_\_\_\_
2. Are you a for-profit or a non-profit site?
  - a. Yes (non-profit)
  - b. No (for-profit)
3. Are you registered by the Department of Public Welfare, Department of Education, or both? [INTERVIEWER – INDICATE ALL THAT APPLY]
  - a. PA Department of Public Welfare Certificate of Compliance
  - b. PA Department of Education, including a private academic school license
  - c. No, not registered
4. Where is your facility located, such as in a public or private school, an independent center, a home, or in a religious institution?
  - a. Public school
  - b. Non-public or private school
  - c. Child care center
  - d. Private home
  - e. Church/synagogue or other religious institution
  - f. Other (specify) \_\_\_\_\_
5. Is your site owned, operated, or managed by a religious organization? (This does not include simply occupying or renting space in a religious building.)
  - a. Yes
  - b. No

[INTERVIEWER – CODE AS “No, not accredited” and SKIP TO #8 IF UNREGULATED]

6. Is your center accredited by any professional organization, or are you working toward accreditation?
  - a. Yes

- b. Working toward accreditation
  - c. No, not accredited [SKIP TO #8]
7. **If accredited or working toward accreditation** – By whom? (INDICATE ALL THAT APPLY)
- a. National Association for the Education of Young Children (NAEYC)
  - b. National Child Care Association (NCCA)
  - c. Council on Accreditation of Services for Children and Families (COA)
  - d. National Association for Family Child Care (NAFCC)
  - e. Association of Christian Schools International (ACSI)
  - f. Other (specify) \_\_\_\_\_

[SKIP TO #9]

8. **If not accredited** – What are some reasons that you are not accredited? [OPEN ENDED RESPONSE ]

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**The next set of questions focuses on the cost of operating your facility.  
Please answer to the best of your ability.**

### Funding Characteristics

9. What is your total yearly operating budget for this site? \$\_\_\_\_\_
- a. Do you receive donated space or space at a substantially reduced cost that is not included in the figure that you just gave for your operating budget?
    - 1. Yes
    - 2. No
10. What percentage of your operating budget comes from parent charges, from public subsidies or the government, or from private sources such as foundations or corporations?
- a. From parent charges? \_\_\_\_\_%
  - b. From public subsidies or government? \_\_\_\_\_%
  - c. From private sources (e.g., foundations or corporations)? \_\_\_\_\_%

[INTERVIEWER – SKIP TO #14 IF DO NOT COLLECT PARENT CHARGES.]

11. Do you serve [INSERT CATEGORY]?

	Yes	No
a. Infants (0-17 months)	1	2

b. Toddlers (18 – 35 months)	1	2
c. Children ages 3 – 5 years	1	2

12. What is the full charge (that is, the maximum paid by a parent for one child) for each age group of children you serve? Please specify whether the charge is hourly, part day, full day, weekly, or monthly. [INTERVIEWER –MAKE SURE RESPONDENT INDICATES THE HIGHEST NORMAL FEE PAID BY PARENTS, NOT INCLUDING DISCOUNTS FOR SPECIAL FEES. ONLY COMPLETE ONE FIGURE PER LINE, EXCEPT IF RATE IS DIFFERENT FOR DIFFERENT BILLING PERIODS.] [do you serve these ages and how do they pay]

	Hourly	Part Day	Full Day	Weekly	Monthly
a. For infants (0 – 17 months), what is the charge?	\$ _____	\$ _____	\$ _____	\$ _____	\$ _____
b. For toddlers (18 – 35 months), what is the charge?	\$ _____	\$ _____	\$ _____	\$ _____	\$ _____
c. For children ages 3 – 5 years, what is the charge?	\$ _____	\$ _____	\$ _____	\$ _____	\$ _____

13. Do you offer some kind of sliding fee, scholarship, or other special financial help to low-income families, other than government subsidies, to help them afford your services?
- Yes – **If yes** - Is it a sliding fee scale based upon family income or a scholarship or other kind of fee reduction?
    - Sliding fee scale based upon family income
    - Scholarships or other fee reductions
  - No
14. How many children do you have whose charges are paid for fully or in part by subsidies, government funds, or another agency? **Number of children receiving subsidies** \_\_\_\_\_#
15. What is the maximum number of full time children receiving subsidies that you could enroll? **Maximum enrollment of full time subsidized children** \_\_\_\_\_#
16. Do you provide information to parents about government subsidies for child care?
- Yes
  - No
17. How difficult is it for you to make ends meet to keep your center going – very difficult, somewhat difficult, or not at all difficult?
- Very difficult
  - Somewhat difficult
  - Not at all difficult
18. When did you last increase your charges?

- a. Month \_\_\_\_ Year \_\_\_\_ [BE SURE TO PROBE FOR ESTIMATE OF MONTH AND YEAR]
- b. New program so N/A
- c. Never [SKIP TO #20]

19. The last time you raised your charges, what was the average percentage increase?  
 \_\_\_\_\_%

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**In this section, we would like to obtain information about the characteristics of the staff at your site, including information about the number employed, their length of employment at your facility site, their race, educational background and salary history. The following categories will be used to group the type of staff that you may have: Director/Program Coordinator, Primary Classroom Staff (includes Group and Assistant Group Supervisors or Teachers and Teaching Assistants but not aids), and Aids. [INTERVIEWER NOTE – ONLY READ DEFINITIONS IF THEY ASK FOR CLARIFICATION OF STAFF CATEGORIES—HELP SCREEN]**

Director/Program Coordinator/Assistant Director – A director is responsible for the general management of the facility, including the following minimum duties: (1) Administering finances, personnel, maintenance, meal planning and preparation and transportation. (2) Administering the facility's program objectives and activities. (3) Designating a staff person who is responsible for compliance with this chapter in the Director's absence. (4) Coordinating and planning daily activities with the group supervisors or with the assistant group supervisors in school-age program. (5) Overall program planning. (6) Written evaluation of staff persons on a regular basis, a minimum of one evaluation every 12 months.

Primary Classroom Staff includes Group Supervisor/Assistant Group Supervisor/Teacher/Teaching Assistant – A group supervisor is responsible for the following minimum duties: (1) Planning and implementing daily program activities. (2) Coordinating activities of assistant group supervisors and aides. (3) Assisting the director with designated activities. An assistant group supervisor is responsible for the following minimum duties: (1) Assisting in the implementation of daily activities under the guidance of the group supervisor. (2) Coordinating daily activities and supervising aides in the absence of the group supervisor.

Aide– An aide is responsible for assisting in the implementation of daily program activities.

### **Staff Characteristics**

## Demographic Information

20. Our first set of questions focuses on demographic information about your staff.  
[INTERVIEWER – COMPLETE EACH COLUMNS FOR ROWS 1, 2, AND 3  
BEFORE GOING TO THE NEXT COLUMN.]

- a. DIRECTOR/PROGRAM COORDINATORS. (a1, a2, a3)
- b. PRIMARY CLASSROOM STAFF (b1, b2, b3)
- c. AIDES (c1, c2, c3)

	a	b	C
	Director/Assistant Director/Program Coordinator	Primary Classroom Staff	Aide
First of all, how many [INSERT STAFF CATEGORY] do you employ?			
<b>1. Employment</b>			
How many [INSERT STAFF CATEGORY] are on your payroll full-time?			
How many [INSERT STAFF CATEGORY] are on your payroll part-time?			
<b>2. Race/ethnicity</b> - What is the race/ethnicity of the [INSERT STAFF CATEGORY]?)			
African-American/Black			
Caucasian/White			
Asian/Pacific Islander			
Latino/Hispanic			
Other (specify) _____			
<b>3. Length of employment at center</b>			
How many [INSERT STAFF CATEGORY] have been employed for less than 1 year?			
How many [INSERT STAFF CATEGORY] have been employed 1 to 5 years?			
How many [INSERT STAFF CATEGORY] have been employed for more than 5 years?			

## Educational Background

21. In the next question, we'd like to know about the highest level of education attained  
by your staff.

- a. What is the HIGHEST level of education attained by the Director/Program  
Coordinator(s)?
- b. You mentioned that you have a total of [INSERT NUMBER] Primary  
Classroom Staff, what is the (are their) highest education level(s) attained?

[INTERVIEWER, ENTER APPROPRIATE NUMBERS FOR EACH CELL BASED  
ON RESPONSE. PROBE IF RESPOND THAT A STAFF PERSON HAS LESS THAN  
A HIGH SCHOOL DEGREE TO FIND OUT IF IT'S LESS THAN 8<sup>TH</sup> GRADE.]

	a. Director/Assistant Director/Program	b. Primary Classroom Staff, <u>not</u> including
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	Coordinator	Aides
Less than 8 <sup>th</sup> grade education		
Less than high school diploma but more than 8 <sup>th</sup> grade education		
High school diploma or GED		
Certificate, credential or Associate Degree (including Child Development Associate)		
Bachelor Degree		
Master's, Doctorate, or other advanced degree		

[INTERVIEWER NOTE: THIS SHOULD ADD UP TO SAME TOTALS AS IN 20]

22. Do any of your Directors or Program Coordinators also function as primary care or teaching staff on a regular basis?

a. Yes

1. How many function in this dual capacity? \_\_\_\_\_

b. No

## Wage and Salaries

23. Next, we would like to find out about average salaries in the first and fifth years of employment for staff in various positions.

a. For Director/Program Coordinator(s), what is the average salary in the first year? In the fifth year? Is that number hourly, monthly, or annual? [a1, a2]

b. For Primary Classroom Staff, what is the average salary in the first year? In the fifth year? Is that number hourly, monthly, or annual? [b1, b2]

c. For Aides, what is the average salary in the first year? In the fifth year? Is that number hourly, monthly, or annual? [c1, c2]

	a. Director/Assistant Director/Program Coordinator	b. Primary Classroom Staff	c. Aides
1. In their <b>first</b> year?			
2. In their <b>fifth</b> year?			

## Benefits and Vacation

24. Do **full-time** staff receive any of the following types of benefits?

	Yes	No
a. Paid vacation	1	2
b. Health insurance for self	1	2
c. Health insurance for family members	1	2
d. Retirement benefits	1	2
e. Child care (includes free or reduced care in your facility)	1	2
f. Paid sick leave/personal days	1	2

25. Do part-time staff receive any benefits?

- a. If **yes** – Are they equal to full-time benefits, or are they pro-rated based on the number of hours worked?
  - 1) Equal to benefits received by full-time employees
  - 2) Benefits are pro-rated based on hours worked
  - 3) Other (specify) \_\_\_\_\_
- b. No

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This next section focuses on training needs and recruiting and retaining staff. Please provide your best assessment of what would be beneficial to prepare and retain staff in early childhood programs.

## Training and Professional Development

26. Please indicate the average hours per year that a typical staff person at your center spends in in-service workshops or receiving training to enhance their professional skills?
  - a. Director/Assistant Director/Program Coordinator: \_\_\_\_\_ hours
  - b. Primary Classroom Staff: \_\_\_\_\_ hours
  - c. Aide: \_\_\_\_\_ hours
27. Does your organization pay for training expenses, such as registration fees, for staff to attend training for at least 6 hours?
  - a. Yes, full payment
  - b. Yes, partial payment
  - c. No
28. Does your organization pay staff for at least 6 hours of staff's time to attend training?
  - a. Yes, at full wages
  - b. Yes, at part wages
  - c. No
29. Has any of your staff have received training from any of the following sources in the past year? [INTERVIEWER—HELP SCREEN=
  - [KURC=Keystone University Research Corporation]
  - [PAEYC=Pittsburgh Association for the Education of Young Children]
  - [DVAEYC=Delaware Valley Association for the Education of Young Children]
  - [PACCA=Pennsylvania Child Care Association]
  - [TEACH=Teacher Education And Compensation Helps]

	<i>Yes</i>	<i>No</i>
<i>a. From the child care training system (e.g., Pathways (old KURC) or local contractors)</i>	<i>1</i>	<i>2</i>
<i>b. On-site (e.g., mentoring, consulting, technical assistance)</i>	<i>1</i>	<i>2</i>
<i>c. At professional conferences (e.g., PAEYC, DVAEYC, PACCA)</i>	<i>1</i>	<i>2</i>

d. At higher education institutions (e.g., TEACH)	1	2
e. Any other sources? (specify) _____	1	2

*[SKIP TO #31 IF DID NOT RECEIVE ANY TRAINING OR IF ONLY RECEIVED ONE TYPE OF TRAINING.]*

30. You reported that staff received training at [INSERT RESPONSES WHERE THEY SAID “YES” TO 29]. Of these, which source of training was most useful?

- a. Child care training system (KURC or local contractors)
- b. On-site (e.g., mentoring, consulting, technical assistance)
- c. Professional conferences (e.g., PAEYC, DVAEYC)
- d. Higher education institutions (e.g., TEACH)
- e. Other

31. On average, what is your best estimate of how much your organization spends on training and professional development on an annual basis? \$\_\_\_\_\_

32. Does your facility have a computer with access to the Internet?

- a. Yes
- b. No

33. In which of the following areas do you feel that your staff, new or current, need more training?

a. Training areas:

<b>Training areas:</b>	Yes	No
a) Health and safety practices	1	2
b) Education and care of infant/toddler ages birth to 34 months	1	2
c) Education and care of children ages 3 – 5 years	1	2
d) Education and care of young children with disabilities	1	2
e) Working with families	1	2
f) Early number skills	1	2
g) Early literacy skills (reading, writing)	1	2
h) Early language skills	1	2
i) Helping children get along with others	1	2
j) Behavior management (e.g., discipline)	1	2
k) Measuring children’s progress	1	2
l) Classroom management/organization of a group of children	1	2

[INTERVIEWER – SKIP TO #34 IF ONLY INDICATE ONE OR TWO TRAINING AREA NEEDS]

b. You said that your staff need more training in [INTERVIEWER READ BACK THE AREAS MENTIONED]. Of these, in which two areas is there the greatest need for more training?

- ☐ Health and safety practices

- ☐ Education and care of infant/toddler ages birth to 34 months
- ☐ Education and care of children ages 3 – 5 years
- ☐ Education and care of young children with disabilities
- ☐ Working with families
- ☐ Early number skills
- ☐ Early literacy skills (reading, writing)
- ☐ Early language skills
- ☐ Helping children get along with others
- ☐ Behavior management (e.g., discipline)
- ☐ Measuring children's progress
- ☐ Classroom management/organization

34. Do you feel that Directors and Program Coordinators need more training in program administration (that is addressing the fiscal, business, and personnel issues related to running a center)?

- a. Yes
- b. No

35. How often would you say that each of the following are issues for obtaining training for you or your staff: always, sometimes, or never.

	<b>Always an issue</b>	<b>Sometimes an issue</b>	<b>Never an issue</b>
a) Cannot afford training costs (e.g., registration fees)	1	2	3
b) Staff are not paid for the time they spend in training	1	2	3
c) Staff are not interested in training beyond the required 6 hours	1	2	3
d) Training opportunities are not accessible	1	2	3
e) Training is too elementary	1	2	3
f) Lack of funding for substitutes to replace those attending training	1	2	3

## **Recruitment and Retention of Staff**

36. Have any regular (whether full-time or part-time) staff members left the center in the last 12 months?

- a. Yes [INTERVIEWER COMPLETE IN THIS SEQUENCE: a1, a2, b1, b2, c1, c2]

	<b>a. Director/Assistant Director/Program Coordinators</b>	<b>b. Primary Classroom Staff</b>	<b>c. Aides</b>
1. How many [INSERT CATEGORY] left in the past year? This number can apply to several people that have left the same	_____ #	_____ #	_____ #

position.			
2. What was the average time required to fill the vacancies?			

b. No

37. On a scale of “1” – “Not at all a challenge” to “5” – “A big challenge,” please rate how much of a challenge the following issues are when recruiting and retaining staff (including directors and program coordinators)? [LIKERT SCALE 1-5 FOR NOT AT ALL A CHALLENGE TO VERY BIG CHALLENGE]

	Not at all a challenge		Neutral		A big challenge
a. High competition with other employers	1	2	3	4	5
b. Lack of availability of qualified people who meet acceptable standards	1	2	3	4	5
c. My site location is undesirable	1	2	3	4	5
d. Hours are too long or inconvenient	1	2	3	4	5
e. Lack of advancement opportunities	1	2	3	4	5
f. The stress of the job	1	2	3	4	5
g. Low pay	1	2	3	4	5
h. Inadequate benefits	1	2	3	4	5

i. Any other challenges?

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38. Do you see yourself continuing in this line of work in the long term, or is this temporary?

- a. Continue long term
- b. Temporary

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**In this next section, we would like to get some information about the types of children and families that attend your programs.**

*Participants*

39. What percentage of families that you serve is struggling to make ends meet? \_\_\_\_%
40. What is the racial or ethnic breakdown of children in your program? Please provide the actual number of children for each racial or ethnic category.
- a. African-American/Black \_\_\_\_\_ #
  - b. Caucasian/White \_\_\_\_\_ #
  - c. Asian/Pacific Islander \_\_\_\_\_ #
  - d. Latino/Hispanic \_\_\_\_\_ #
  - e. Other (specify) \_\_\_\_\_ #
41. Assuming every child were full time, we'd like to know about the number enrolled, your capacity to serve, the average attendance, number of staff, and number of rooms or classes for the full time children you serve by age group.
- a. For infants, ages 0 – 17 months, what's the number enrolled? Your capacity? The average daily attendance? The number of staff? The number of rooms for infants?
  - b. For toddlers, ages 18 – 35 months, what's the number enrolled? Your capacity? The average daily attendance? The number of staff? The number of rooms?
  - c. For 3 – 5-year-olds, what's the number enrolled? Your capacity? The average daily attendance? The number of staff? The number of rooms?

[INTERVIEWER HELP SCREEN]

[ENROLLMENT=NUMBER OF CHILDREN ON ROSTER]

[CAPACITY=MAXIMUM NUMBER OF CHILDREN SITE CAN TAKE]

[AVERAGE DAILY ATTENDANCE=ON ANY GIVEN DAY, HOW MANY CHILDREN ARE PRESENT]

[# STAFF=NUMBER ASSIGNED TO ROOM]

[# ROOMS OR CLASSESS=NUMBER PER AGE GROUP]

	Enrollment	Capacity	Average daily attendance	# Staff	# Rooms or Classes
a. Infants (0 - 17 months)					
b. Toddlers (18 – 35 months)					
c. Preschoolers (3 – 5 years)					

\*Enter "0" in Enrollment and Capacity if do not serve children these ages.

42. On average, how many hours per week do Directors spend in rooms with the children present monitoring direct care staff and providing feedback to staff based on this monitoring? \_\_\_\_\_ # hours per week
- 

In this section, we are interested in finding out about things you do in your program for children ages 3 through 5 years in your care.

[PROGRAM CONTENT – TO BE COMPLETED ONLY BY PROGRAMS **FOR 3 – 5 YEAR-OLDS**; OTHERWISE, SKIP TO #47]

43. Do you regularly use a written manual, program guide, curriculum, parts of a curriculum, or written lesson plans?
- a. Yes
  - b. No

44. Some programs teach specific skills and others do not. Do you attempt to teach children any of the following skills or behaviors?

	YES	NO
a. How to separate from parents	1	2
b. The names of many colors and shapes	1	2
c. Hop, skip, and move to music	1	2
d. Play cooperatively with other children	1	2
e. Recognize many letters of the alphabet	1	2
f. Prewriting (coloring figures with lines, draw shapes, tracing)	1	2
g. Count to ten	1	2
h. Cooperate with teacher	1	2
i. Follow directions	1	2
j. Work independently	1	2
k. Read many words	1	2
l. Recognize feelings	1	2
m. Appreciate their culture and other cultures	1	2

45. Do you use developmental or achievement assessments to guide what you teach the children or to measure progress?

a. Yes - What assessment do you use [OPEN-END--CHECK ALL THAT APPLY]?

1. Denver
2. ELAP (Early Learning Accomplishment Profile)
3. LAP (Learning Accomplishment Profile)
4. Bayley Scales of Infant Development
5. Work Sampling System
6. Woodcock Johnson
7. Bracken Basic Concept Scale
8. Other (specify) \_\_\_\_\_

b. No

46. Do you regularly interact or communicate with the public schools in your area regarding the children at your site?

a. Yes – If **yes** – Do you interact or communicate with the public schools in any of the following ways?

a. Talk with public school teachers to teach the social and academic skills needed to prepare children for school	Yes	No
b. Routinely pass on records of our children.	Yes	No
c. Inform the school of children coming to them with special needs	Yes	No
d. Participate in joint training.	Yes	No
e. Coordinate kindergarten registration	Yes	No
f. Hold conferences with school	Yes	No
g. Take preschool children to visit their public schools	Yes	No
h. Help inform parents about kindergarten readiness and expectations	Yes	No

b. No



**Parent Involvement in Programs –****TO BE ASKED OF ALL AGES**

47. Some centers involve parents in their programs and others do not. The next group of questions focuses on things you might do to involve parents in your program.

	Yes	No
a. Do you regularly ask parents to donate snacks or materials for special events?	1	2
b. Do you regularly ask parents to volunteer (e.g., help at parties or drive for field trips)?	1	2
c. Do you regularly ask parents to attend parent meetings?	1	2
d. Do you regularly discuss children's progress with parents?	1	2
e. Do you regularly provide suggested activities for parents to complete at home that expand on what is being taught during the day?	1	2
f. Do you regularly provide or connect parents with parent education workshops or activities?	1	2

48. Do you administer medication for children in your center?

- a. Yes – **If yes** - Does your staff receive any training on administration of medication?
  1. Yes
  2. No
- b. No

49. Have you or any of your staff asked for special assistance from anyone within or outside your site for any of the following problems that children may have?

	YES	NO
a. Tantrums, biting	1	2
b. Aggressive behaviors (e.g., toward self, adult, other children)	1	2
c. Withdrawn behaviors (e.g., lack of interaction with others or primarily playing alone)	1	2
d. Wetting or soiling for a toilet-trained child	1	2
e. Crying, clinging or separation issues	1	2
f. Cognitive or Mental delays	1	2
g. Language or speech delays	1	2
h. Physical impairments (vision, hearing, cerebral palsy)	1	2

50. In the last 2 years, have you had to exclude a child for aggressive behaviors or have you had to advise parents to get help for a child with such problems or you would have to exclude the child?

- a. Yes
- b. No

51. This question focuses on children who have been diagnosed with special needs. Please indicate the primary category for each child so that children with multiple delays are counted once and only in their primary category. How many children do you serve that primarily have [INSERT CATEGORY]?

- a. Cognitive/Mental delays \_\_\_\_\_#
  - b. Social/emotional or significant behavior problems \_\_\_\_\_#
  - c. Physical impairments (including vision, hearing, paralysis) \_\_\_\_\_#
  - d. Speech/language delays \_\_\_\_\_#
52. Have you ever needed to seek services to help you serve children with special needs or aggressive or withdrawn behaviors?
- a. Yes [SKIP to #56]
  - b. No
53. Did you try to seek services for those children?
- a. Yes
  - b. No [SKIP to #56]
54. Did you get the services?
- a. Yes
  - b. No [SKIP to #56]
55. Were the services helpful?
- a. Yes
  - b. No

### **Perceptions Regarding Capacity and Quality in Early Care and Education Programs**

*Finally, we have a couple of questions about general issues in the field and potential policy implications.*

56. If state government were to take additional action with respect to early childhood services, what would you advise them to do? List up to three priorities. [OPEN ENDED]

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57. If you could borrow at low interest rates funds from the government for your business, would you?

- a. Yes – If **Yes** - For what would you primarily use those funds? [OPEN ENDED – INTERVIEWER MUST CODE BASED ON RESPONSE]

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- b. No

Thank you for completing this telephone interview with us. Your responses are very helpful to the State.

We also want to take this time to let you know that there is a second phase to this project, an observational visit. In about a week, a specialist from Penn State will contact you and will send you an invitation letter and informed consent to obtain your permission for trained observers to visit your site. As a way of thanking you for participating in this second phase of the project, you will be given a “goodie bag” for your site. Although you are free to not participate in the second phase of this project, we do encourage your participation because the observation along with this interview you just completed will help to inform the Governor’s Early Childhood Task Force about what is needed in early childhood care and education in Pennsylvania.

Again, thank you for your time today.